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NOVEMBER

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Tablet? SmartTablet? Tabletphone? Bah!

The defining line between devices continues to blur, and for once it's making me a little dizzy. I can't even imagine what it's doing to everyday consumers. Just as we were pushing the last few pages of this issue to press, we received the very interesting, but category-blurring Asus Eee 1215N. This netbook has a dual-core Atom processor, a 12-inch screen, and a 250GB hard drive. It costs around $500. A 12-inch screen? On a netbook? I have a 3-year-old ThinkPad X61t laptop that's the same exact size.

If you are familiar with Lenovo's ThinkPad lineup, you know that the "t" in the notebook's model number designates a pen-based tablet system. In 2010, these ThinkPads have essentially been reduced to "legacy tablet" status. In the meantime, the tablet category is becoming trickier and trickier to decipher. For now, the iPad is the prototypical tablet, but it's substantially bigger than Dell's highly anticipated Streak, which is itself only about 25 percent bigger than a regular smartphone. Aren't touch-screen smartphones pretty much tablets, anyway? Not that this clarifies things, but the N900 is smartphone-size, but Nokia calls it a tablet. It even comes with a stylus. According to my logic, this would make the N900 a hybrid smartphone cum legacy tablet, otherwise known as a "legacytabletphone."

In an ironic twist, convergence—the point at which all of our devices are linked to each other, theoretically providing a seamless computing experience—is rapidly creating divergence. And it's confusing.

Thankfully, the desktop PC still stands tall. I'll confess to considering the possibility a few years ago that the desktop's days were numbered. However, when you consider all the tasks a single moderately powered PC is capable of, and then consider all the forms of content these portable devices are capable of generating, the PC suddenly begins to feel even more essential. As a server, a photo/video production system, a storage device, a home theater, and more.

Then there's gaming. Desktop PCs are capable of providing thrills and a level of immersion that console systems can't match. (By the way, this month's cover story officially marks our entry into monthly PC building projects. Based on all the feedback we received, deciding to build a budget gaming rig was a no-brainer. Next month, we're going to try to squeeze as much power as possible into a small formfactor box.)

In the meantime, starting today we're going to make a concerted effort to help consumers understand tablets, smartphones, and more with a brand-new magazine. This month, we're launching *Maximum Tech*, which applies our Lab's pragmatism and enthusiasm to consumer electronics. If you like what we're doing here, you'll love *Maximum Tech*. Finally, if you're curious about the Asus Eee 1215N, check back here next month for a full review.

THE NERD IN CHIEF'S PICKS

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LETTERS POLICY Please send comments and questions to george@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Unfortunately, George is unable to respond personally to all queries.

THE NEWS

AMD: Hyper-Threading Is for Wimps

Company details its eight-core Bulldozer CPU, which breaks ground by using a modular approach —GORDON MAH UNG

You can't say that AMD is ever boring. The company says its next-generation Bulldozer CPU core will take a unique approach to computing that goes beyond Hyper-Threading, a change some believe could offer phenomenal performance.

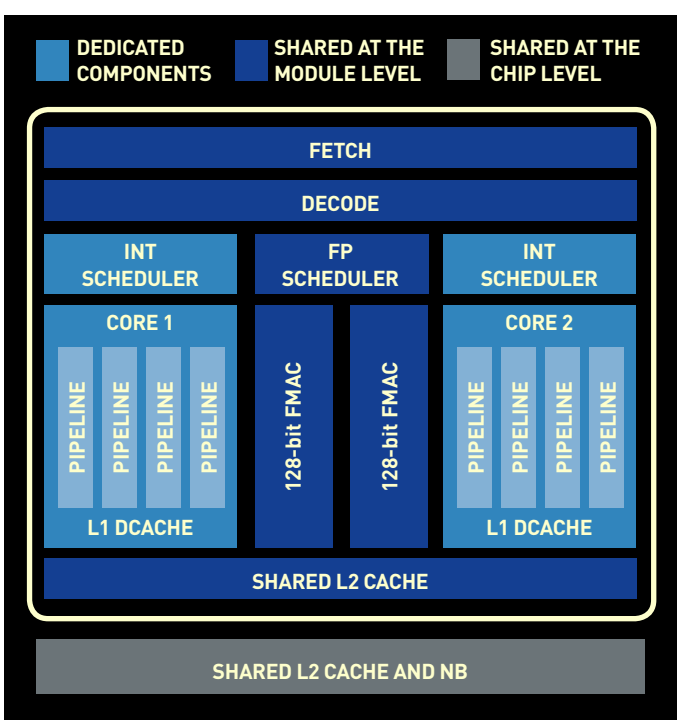
Bulldozer represents a fairly big break from how today's multicores are constructed. Today's dual-, quad-, and hexa-cores are based on single-cores strung together. They can share L2 or L3 cache, but generally are partitioned off from each other. With Bulldozer, the basic building block of a multi-core chip changes from a walled-off single-core to more of a duplex. Two cores are tightly intertwined and share fetch, decode, floating-point scheduler, and dual 128-bit fused-multiply-accumulate units, or FPUs. AMD says each module includes dedicated integer schedulers, pipelines, and L1 cache.

This, AMD says, is far superior to Intel's Hyper-Threading, which can bog down when the same resources are under load.

WITH BULLDOZER, THE BASIC BUILDING BLOCK OF A MULTI-CORE CHIP CHANGES FROM A WALLED-OFF SINGLE-CORE TO MORE OF A DUPLEX

Hyper-Theading was introduced by Intel in 2002 and takes a single-core and shares its resources by creating a virtual core. In the Pentium 4 days, HT added a 10 to 15 percent performance increase, and in Core i7 chips, performance can be boosted 20 to 25 percent, depending on the application.

Just adding dedicated, partitioned cores is a "brute force" approach that wastes resources, AMD says. With its shared resources, Bulldozer can reduce power consumption and shrink the die size, which in turn lowers the cost to produce the chip. AMD says the server version of its Bulldozer chip should deliver 33 percent more cores and a 50 percent increase in "throughput" in the same power envelope as a 12-core Magny-Cours Opteron chip.



In AMD's modular chip design, the distinct processing cores share many resources for greater efficiency.

"One of the important things here is that Bulldozer is one of the first all-new designs from AMD in a decade," says analyst Nathan Brookwood of Insight 64. Brookwood says one of the more exciting design changes in Bulldozer is its ability to dynamically reallocate resources on single-threaded tasks. On a traditional dual-core, the resources for each walled-off core cannot be combined. In Bulldozer, all of the resources of the module can be thrown at a thread.

"The single-core performance on some floating-point applications is going to be mind-boggling," Brookwood says.

AMD officials say Bulldozer is being targeted at servers and performance desktop machines. The good news is that Bulldozer will be drop-in compatible with most current high-end servers. The bad news is that it won't be compatible with existing AM3 boards. Instead, AMD says it will introduce a new AM3+ socket. These sockets will be backward compatible with older chips so you could drop a Phenom II X6 in it. According to AMD, Bulldozer will be built on a new 32nm process at Global Foundries.

The chip company also released more details on its Bobcat CPU. For more on that, see our Fast Forward column on the next page.

Scosche USB 2.0 Charge and Sync Cable

Whether you like to use your mobile phone as a USB hard drive or you've got a newfangled, four-inch Android phone with three hours of battery life, chances are you sometimes need to plug in your phone away from home. Scosche saves the day with its keychain-size, folding USB cables, available in USB Micro/Mini and iPhone varieties ($20, www.scosche.com). They're small, they work—what more could you ask for? –AC

GEEK TESTED & APPROVED

3D Cameras Are Coming

Yes, you can produce 3D pictures and movies

With its 3D conversion lens attached, Panasonic's HDC-SDT750 will record 1080p 3D video.

The current 3D craze doesn't just involve consumers watching 3D content, but also making it. At least that will be the case once two new products from FujiFilm and Panasonic are released this fall.

FujiFilm's W3 3D 10-megapixel point-and-shoot will come equipped with two built-in lenses (a prerequisite for shooting in 3D), 3X optical zoom, and a 3.5-inch autostereoscopic screen that displays 3D images and video without the need for hokey 3D glasses (a la the Nintendo 3DS). HDMI-out lets you connect the cam to a large 3D display to enjoy 3D 720p video. The cost? $500. (See our hands-on impressions at http://bit.ly/9xzJOQ).

Panasonic's HDC-SDT750 will be the world's first consumer 3D camcorder, sporting full 1080p video that can be transferred and viewed on any 3D-capable panel. The camera requires a 3D conversion lens, which will come included, to record right- and left-eye images simultaneously. Expect to see the HDC-SDT750 for $1,400.

Now can we please get our hands on a 3D SLR? Drool. –AF

NAB SEEKS FM MANDATE

Device makers aren't happy about it

The National Association of Broadcasters (NAB) and the Recording Industry Association of America (RIAA) are asking congress to mandate that FM chips be built into all portable devices, citing the need to give consumers "more music choices."

But the Consumer Electronics Association (CEA), which represents device makers and would be responsible for overseeing the transition, thinks it's a pretty weak move. As ArsTechnica.com reports, CEA President Gary Shapiro called the plan "the height of absurdity," saying, "Rather than adapt to the digital marketplace, NAB and RIAA act like buggy-whip industries that refuse to innovate and seek to impose penalties on those that do."

The plan stems from the ongoing battle between the NAB and RIAA over music royalties, which broadcasters currently don't pay. The NAB says it will pay $100 million a year for music rights, but only if Congress mandates the FM chips, which would ostensibly broaden the radio audience. The RIAA endorses the plan since it would ensure the royalty payments. –KS

AMD's Bobcat Bares Teeth at Atom

Finally! After two years of watching Intel's Atom conquer the netbook market, AMD is introducing a competitive low-power x86 processor core. Code-named Bobcat, it's entering production now and should appear in systems early next year—just in time to miss the holiday shopping season.

Bobcat will debut in "Ontario," AMD's first CPU/GPU Fusion chip. The Bobcat CPU core will share the same die with a GPU derived from an ATI 5000-series discrete GPU. AMD calls the combo an accelerated processing unit (APU) and has been promising Fusion chips since acquiring ATI in 2006. Better late than never. (The first Fusion chip was supposed to be "Llano," a quad-core PC processor, but AMD has delayed its introduction until 2011.)

Actually, AMD is introducing two new processor cores at the same time. Bobcat is the low-power core, and "Bulldozer" is a higher-performance core for PCs, servers, and mainstream notebooks. Bobcat is designed for netbooks, thin-and-light notebooks, and embedded applications.

Until now, AMD hasn't been able to compete with Atom. The two-year-old Athlon Neo, derived from Athlon desktop/server processors, is a sorry substitute that can't match Atom's combination of power efficiency and performance. Bobcat is an entirely new design that simplifies the microarchitecture while adding new power-saving features.

Like Atom, Bobcat is a two-way superscalar processor with a 16-stage instruction pipeline. But whereas Atom always executes instructions in their original program order, Bobcat is a more sophisticated out-of-order machine. It reorders instructions for greater efficiency, then retires results in the original program order.

Unlike Atom, Bobcat isn't multithreaded. Atom has Intel's two-way Hyper-Threading (disabled in some versions), whereas Bobcat is limited to a single thread of execution. But instruction reordering should give Bobcat the edge in single-thread throughput; some software gains little from multithreading.

Bobcat is interesting for two additional reasons: AMD is outsourcing production to an independent foundry in Taiwan, and the core is synthesizable. That means Bobcat could appear in custom system-on-chip (SoC) designs for products far beyond PCs. In any case, Bobcat puts AMD back into the low-power fight with Intel.

Tom Halfhill was formerly a senior editor for *Byte* magazine and is now an analyst for *Microprocessor Report*.

Beware of Screen Smudges

In a report titled, "Smudge Attacks on Smartphone Touch Screens," researchers from the University of Pennsylvania warn that your greasy fingers leave behind a trail that hackers can easily follow to discover your graphical password pattern.

"We believe smudge attacks are a threat for three reasons," the researchers write. "First, smudges are persistent in time. Second, it is surprisingly difficult to incidentally obscure or delete smudges through wiping or pocketing the device. Third and finally, collecting and analyzing oily residue smudges can be done with readily-available equipment such as a camera and a computer."

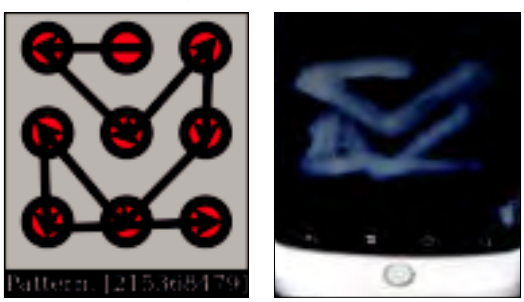
More than just a theoretical threat, the 10-page report goes on to show exactly how easy it is to uncover a graphical password from the leftover residue of oily fingers. —PL

Faster Snapdragon for Q4

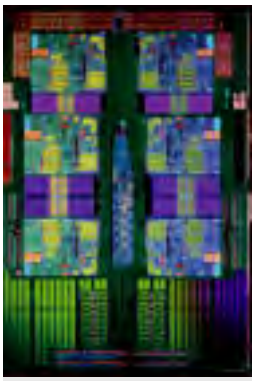
If we had to pick just one favorite feature of modern smartphone design, it would probably be the advent of 1GHz processors, like Qualcomm's Snapdragon and Samsung's Hummingbird. Both could soon be obsolete, however, as Qualcomm gets ready to ship its dual-core QSD8672 CPU, clocked at up to 1.5GHz per core.

We already knew this was in the works, but only had a vague time frame to go on. Now Qualcomm says it will start shipping these newer, faster Snapdragon parts in the fourth quarter.

That still doesn't tell us when actual products built around these new CPUs—such as smartphones and tablets—will hit the street, but according to Mark Frankel, vice president of product management for Qualcomm CDMA Technologies, vendors looking to get a leg-up on the competition could launch products "by Christmas." —PL



The screen on the right shows the telltale signs of an Android password pattern.



AMD's Chipping Spree

On the heels of the much-loved Phenom X6, AMD is introducing a new midrange six-core chip and no fewer than five additional new CPUs.

AMD's hexa-cores can't outstrip Intel's chips in performance, but with Intel's cheapest hexa-core running $800, AMD's chips are proving immensely popular with consumers.

The new 3GHz Phenom II X6 1075T will wholesale for $240, falling between the 1090T and 1055T. For $180, you'll get a 3.5GHz Phenom II X6 970 Black Edition. Even cheaper is the 3.3GHz Phenom II X2 560 Black Edition ($100). Also new are the 3.1GHz Athlon II X4 645 for $120, the 3.2GHz Athlon II X3 450 for $84, and the 3.3GHz Athlon II X2 for $74. —GU

GAME THEORY

Lego My Multiplayer

I think Monica Lewinsky was still making headlines the last time I voluntarily chose to participate in a beta program, so you can imagine the kind of powerful draw required for me to spend time in an unstable, unfinished gameworld. In fact, it took only four little letters: LEGO.

The Lego Universe MMO game already looks terrific. It plays like a light hybrid of the Lego game series and World of Warcraft, with a dash of Club Penguin. Add to this a powerful building element, and you have an MMO game with a vast range of appeal.

But what will it mean? I've been trying for years to figure out where massively multiplayer is going, and to tell the truth, it really hasn't gone anywhere. It began with the gestational Neverwinter Nights/EverQuest/Ultima Online phase, then exploded into a supernova with World of Warcraft, and then... well, that's where it's stayed for the past six years.

World of Warcraft soon shifted its gravitational field from supernova to black hole, sucking in all comers. I never thought City of Heroes, Lord of the Rings Online, or Age of Conan would ever be "WoW killers," but I thought they might at least take a bite out of it. As it stands, WoW still owns more than 50 percent of the MMO market, and there's nothing on the horizon that poses any threat.

Or is there? Could Lego Universe finally be the WoW killer?

It's certainly going to be a huge success, leaving a giant sucking sound in the hallways of Club Penguin and Webkinz. Because it's geared for kids, it's unlikely to hurt WoW at all, but it could potentially become as large as WoW. Since the WoW/Lego audience doesn't overlap much, it will create a reconfigured, much larger MMO space. Thus, Lego will grow the entire market.

This will have a secondary effect: It will mint an entire generation of new MMO players. They'll cut their teeth on a kid-friendly game world, and then graduate to adult MMOs in their teens. If trends continue, this means that Lego Universe is training an entire generation of future citizens of Azeroth.

Thomas L. McDonald has been covering games for 20 years. He is an editor at large for *Games* magazine and blogs at sopgaming.blogspot.com.

Intel Settles with FTC

Denies wrongdoing, but agrees to a host of terms

Intel has agreed to support the PCI-E bus, be friendlier to its competitors' merger plans, tell developers that its compilers may favor Intel chips over AMD's, and agree to stop retaliating against OEMs who use AMD chips, all as part of a settlement with the Federal Trade Commission.

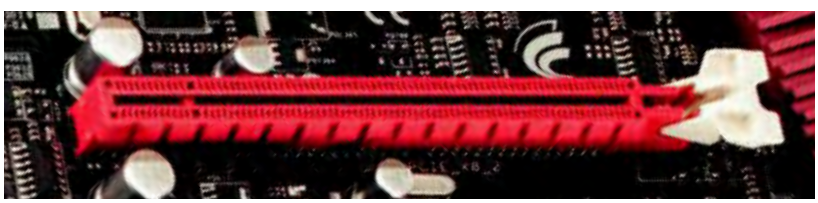
Despite agreeing to the terms of the settlement, Intel maintains it has done nothing wrong.

The FTC settlement comes on the heels of Intel paying AMD $1.25 billion to settle a long-standing anti-competitive civil suit as well as a record-setting $1.45 billion fine by the European Union over similar allegations of anti-competitive practices.

Perhaps the most unusual part of the settlement is the mandate that Intel support PCI-E for six years or until a newer technology supplants it. The FTC insisted on the requirement because it believed Intel could eliminate the bus in order to squelch the growth of GPU-based computing, which is being promoted by both AMD and Nvidia.

Although the PCI-E bus is protected, the FTC settlement doesn't help Nvidia with producing a chipset for Intel's Nehalem line of chips. Nvidia has long claimed that it had the right to build chipsets for Nehalem but Intel said its license was for the front-side bus and didn't include the ability to build for QPI and DMI chips. —GU

THE SETTLEMENT DOESN'T HELP NVIDIA WITH PRODUCING A CHIPSET FOR INTEL'S NEHALEM LINE



Unusual: Under the terms of the settlement, Intel must support PCI-E for six years.

BEYOND EBOOKS

Kindle's Got Game (Two of Them)

The Kindle Development Kit (KDK), launched earlier this year, has spawned two games for the ebook reader: Every Word and Shuffled Row, both word-scramble games. Simple? Sure, and they're also both free. Surely, it's just the beginning of more to come, and we expect to see some paid games show up, as developers get a 70 percent cut of the revenue. —PL

BYTE RIGHTS

QUINN NORTON

Chaotic Neutrality

We like our net the way it is: neutral, flexible, reliably unreliable. But there's nothing to stop the companies that move Internet traffic from ruining everything, they just haven't bothered yet.

We've never had net neutrality. Neutrality's a legal standard, not a way of passing packets. Right now, the net is a working technical system with a big unpatched legal bug. We saw this bug in the wild in 2008, when Comcast started interfering with its customers' ability to seed BitTorrent. The FCC laid the smack down, and Comcast relented. But then in April, an appeals court ruled that the FCC exceeded its authority to regulate the net by requiring Comcast to treat traffic equally. That put the neutrality ball squarely in the Congressional court, where balls often linger, deflate, and slowly melt from exposure and neglect.

Google and Verizon recently proposed neutrality legislation, trying to encourage Congress to pick up the ball before the net starts melting. Their effort is imperfect and has met with a lot of consternation. Net neutrality is going to disappoint. Geeks don't understand why their Internet can't just be left alone, but it can't—the rest of the world crawled in our sandbox with us.

Unregulated packets require regulation, a regulatory agency, and regulatory enforcement in order to prevent companies from mucking with your data stream, either anti-competitively or to charge you more for specific services. But this rightfully scares the net's users because regulation likes to creep, and without a doubt, an agency charged with Internet regulation will be encouraged to creep toward things like annoyingly excessive copyright enforcement.

The tools that could rate-limit apps, punish avid users, or pry into how people's packets already exist. They were developed for applications like defending networks against malicious attacks. That they can be reused to make the net non-neutral is a consequence of computers being so gosh darn flexible. We like them that way, but laws don't. The best geeks can do is explain our end, and try to understand what makes these laws hard to write.

Quinn Norton writes about copyright for Wired News and other publications. Her work has ranged from legal journalism to the inner life of pirate organizations.

THE LIST

9 Nerd Meccas

9 THE SHIRE
Matamata, NZ

Middle-earth isn't real, but you can tour the remains of the hobbiton set.

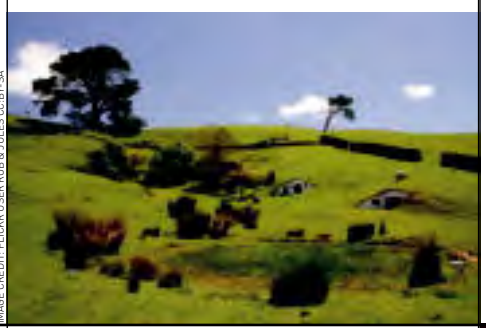


IMAGE CREDIT: FLICKR USER ROB & JULES CC-BY-SA

8 TATOOINE Tunisia

***Star Wars* sets litter the Tunisian desert, and intrepid nerds can visit. Bring sunscreen.**

DREAMHACK
Jönköping, Sweden

7 **With more than 10,000 attendees, it's the largest LAN party in the world.**

COMPUTER HISTORY MUSEUM
Mountain View, CA

6 **ENIAC to Trash-80—it's all here.**

COMIC-CON
San Diego, CA

5 **A four-day celebration of all things nerd.**

4 CSAIL Cambridge, MA

MIT's Computer Science and Artificial Intelligence Lab. Stallman's dojo, LISP's manger.

3 HEWLETT AND PACKARD'S GARAGE
Palo Alto, CA

IMAGE CREDIT: ANN FINNIE, HP

2 SMITHSONIAN NATIONAL AIR AND SPACE MUSEUM Washington, DC

The history of flight, from the Wright Flyer to Apollo landers and beyond.

1 CERN Geneva, Switzerland

Birthplace of the World Wide Web and home of the Large Hadron Collider.

DEATHMATCH

Deathmatch: Apple vs. Android vs. BlackBerry

If you listen to the Maximum PC No BS podcast, you already know that Senior Editor Gordon Mah Ung's current obsession is which smartphone he should upgrade to. Based on the conversations we're hearing and having every day, you're probably obsessing about it, also.

A funny thing has happened in the smartphone space over the last few years. Much like the netbook space, significant consolidation around a few different platforms has resulted in very little variation between phones. Sure, Apple has its A4 CPU, and HTC uses Snapdragon processors, but ultimately they're all variants of the ARM Cortex A8 SoC architecture. Ditto cameras, storage, and touch-screen tech. Software—user interface and operating systems, specifically—are rapidly becoming the decisive factor.

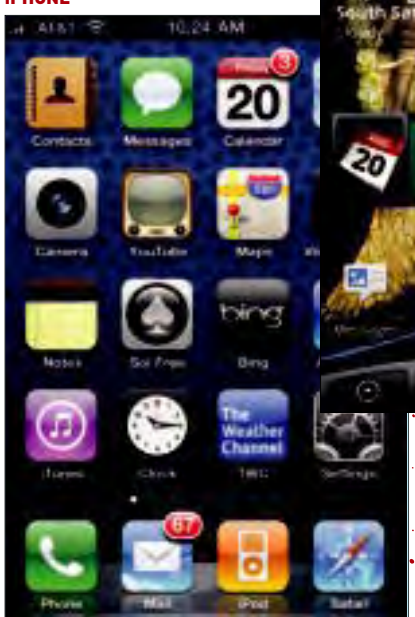
With this in mind, we decided to pit the leading operating systems on the market today—Apple's iOS 4, Android's Froyo 2.2, and RIM's BlackBerry 6—against each other in mortal combat. Yessiree Bob, the Maximum PC Deathmatch has returned. **—GEORGE JONES**

ROUND 1

EASE OF USE On the surface, BlackBerry 6 is RIM's best OS. We love the multiple desktops, the direct access to system settings, and the aggregated social/email/SMS feed is innovative. But below the surface, the operating system's long-standing legacy—which predates these fancy touch screens!—makes performing even basic tasks awkward and unintuitive. Particularly in comparison to the iPhone 4 and Android devices.

Apple's iOS offers the simplest, most straightforward package. Its Multi-Touch gestures are world class, and the multitasking scheme of iOS 4 makes it even easier to use. Android's OS is just as usable, which is admirable given the extra flexibility and power of its operating system (increased options can lead to increased UI confusion). **TIE: iOS AND ANDROID**

iPHONE



ANDROID

BLACKBERRY

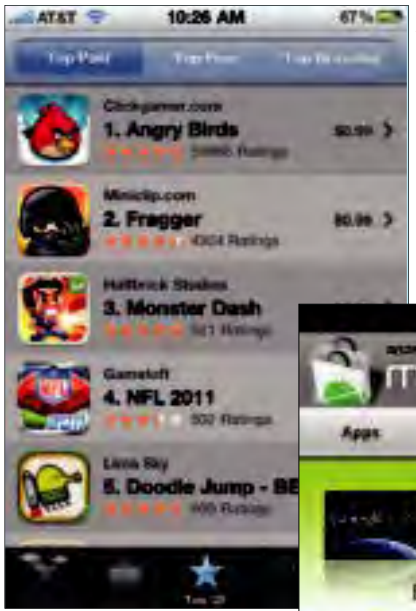
ROUND 2

APPLICATION AND DEVELOPER SUPPORT On the surface, Apple's App Store has a massive advantage, with almost three times the apps available for download. It also offers the best games (Scrabble, Tiger Woods, and Pinball HD, to name just three). Android, however, is catching on fast, and offers less restrictive terms for developers. As the Android OS spreads across all wireless carriers—the installed base is already as big as iOS—we expect that the number of quality apps will quickly begin to rival that of the iPhone's.

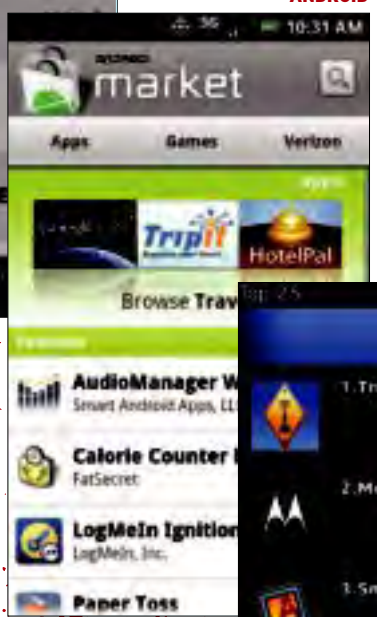
Also, for the time being, all the "essential" apps are already in the Android Market, and the signal-to-noise ratio in the Market is less annoying than in Apple's App Store (a nice side benefit of hosting fewer apps). Despite RIM's 2.0 release of the BlackBerry App World, its library is shockingly deficient in both quality and quantity, confirming BlackBerry's reputation as a no-fun, no-frills device.

TIE: ANDROID AND iOS

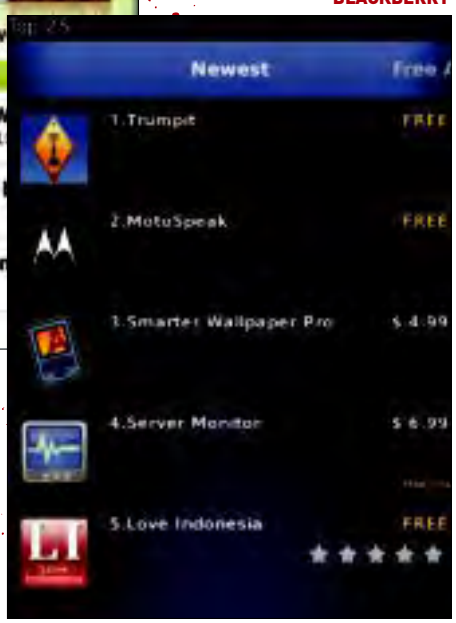
iPHONE



ANDROID



BLACKBERRY



ROUND 3

EMAIL AND MESSAGING Apple's email is straightforward and easy enough to use, but it's not very powerful or customizable. With Android, Google offers instant synchronization with Gmail, and easily integrates multiple accounts. Android's default SMS messaging app is pretty lackluster, but at least you can swap it out for a third-party app. It used to be that BlackBerry was the only push email client in town, but these days, if you or your employer uses Gmail or Microsoft exchange, you'll get the same functionality. Regardless, BlackBerry's encryption and physical keyboard make RIM's platform a must-have if messaging is most important to you.

WINNER: BLACKBERRY

ROUND 4

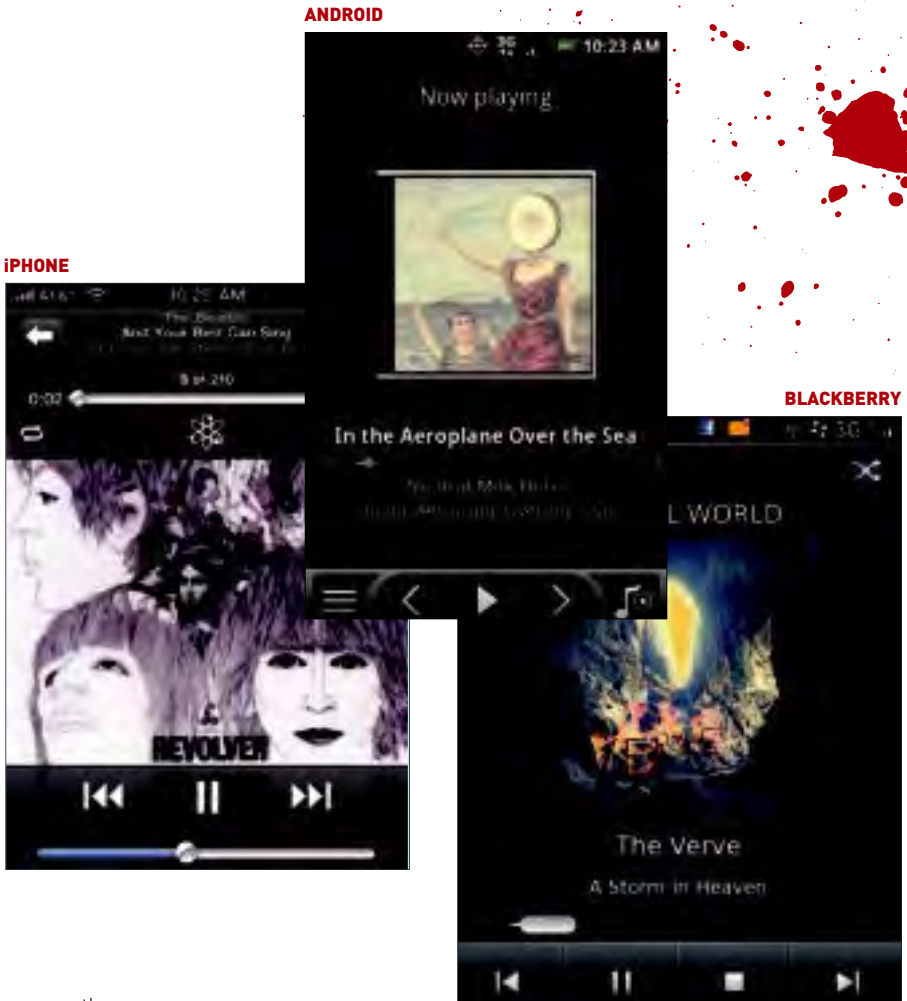
FLEXIBILITY AND CUSTOMIZATION Not surprisingly, neither BlackBerry nor Apple offers a high level of customization beyond color schemes and app icon arrangement. Neither permit the use of live widgets on the desktop, which is a glaring omission—why should you have to launch an app to pull down news headlines when you can view them live on the home screen? BlackBerry does permit some fairly unique notification/ring-tone profiling, at least.

Android stands in refreshing contrast to these closed-off systems. The desktop, widgets, keyboards, applications, and even the stock apps can all be tweaked, customized, and replaced by you, mobile providers, and independent developers. It's clear that Google is encouraging indie developers and mobile operators to push the envelope here, and this will result in a more rapid evolution of the OS. HTC's proprietary "Sense" modification of the Android environment is a great example of the operating system's flexibility.

WINNER: ANDROID

ROUND 5

MEDIA STORAGE AND PLAYBACK All three OSes feature above-average media functionality, which is the death knell for the stand-alone MP3 player category. The newest version of RIM's stock media player is surprisingly polished, making the BlackBerry a bona fide portable music device. Android allows for easy syncing and playback via Windows Media Player, and you can easily drag and drop MP3 files from your computer, or download DRM-free MP3 files from the Amazon MP3 Store app (which, strangely, doesn't come pre-loaded). Apple, of course, includes the ubiquitous iTunes app, and while its software interface is simple and buying songs wirelessly is easy, syncing with the frustrating, DRM-laden desktop client is a huge PITA. **WINNER: ANDROID**



ROUND 6

SECURITY Neither Apple nor Android (nor any other smartphone OS for that matter) can hold a torch to the level of encryption RIM uses in its BlackBerry OS. When national governments consider banning your device, that's a sign security is tight, although RIM's capitulation to UAE does effectively undermine its security. **WINNER: BLACKBERRY**

And the Winner Is...

By the numbers, Android wins four rounds of our Deathmatch (including the ties), Apple's iOS wins two (both of them draws with Android), and BlackBerry wins two. Match, Android.

We spent months using variants of each device, and our conclusion is that Apple's mobile operating system is everything an OS should be: lean, snappy, and easy to use. The Android OS possesses these same attributes, but is more versatile. Ultimately, its more open-ended nature makes for a more forward-thinking environment.

This is a remarkable development. Two years ago, the notion that a mobile OS developed by Google would be capable of challenging and unseating Apple's juggernaut seemed preposterous. As we tested our way through the three different operating systems in this Deathmatch, we began to more fully appreciate Google's accomplishment and populist mentality. It's likely we're looking at the next incarnation of Nokia's ubiquitous Symbian mobile interface.

This is not to say that Apple is fighting a losing battle with iOS. Both the iPad and iPhone 4 have been successful launches by any definition, and these devices remain the benchmark by which all other smartphones and tablets will be compared. Plus, the Cupertino giant's proprietary approach will keep Steve Jobs and crew rolling in ducats for many years to come.

Interestingly, we found ourselves more intrigued by version 6.0 of BlackBerry's user interface than we expected. BB6 lacks the pizzazz and sex appeal of iOS, and the first wave of online reviews weren't kind—mostly because the hardware in the BlackBerry Torch is under-powered. But BB6 is efficiently utilitarian, and we'd have no qualms recommending it.

This month the Doctor tackles...

- Hardware Audit
- Tenacious Viruses
- GPU Upgrades

Should I Format My SSD?

I have been in the computer repair industry for about 12 years. I have always been told it is good to format a hard drive once a year or so just for general maintenance. Is the same true for SSDs?

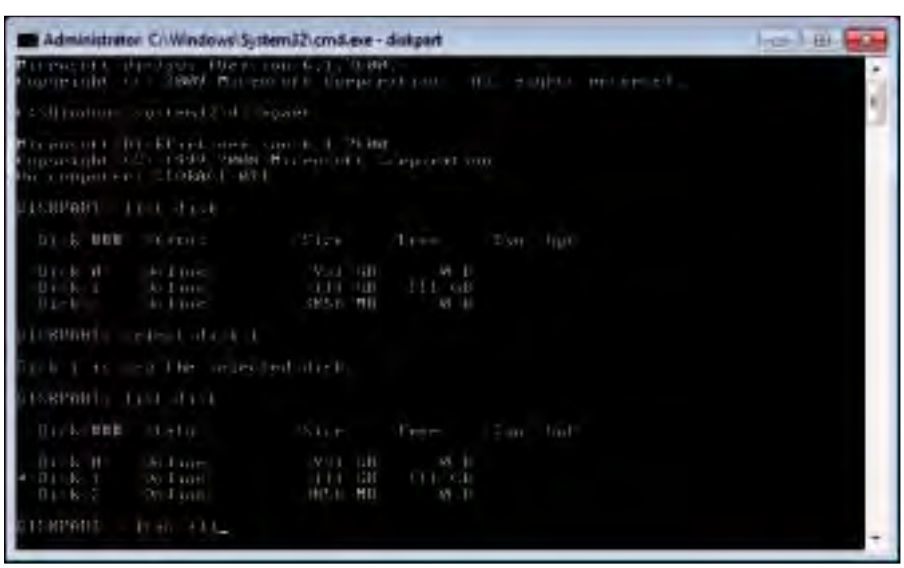
—David Jenkins

That depends, David. If your SSD and OS support the Trim command—which they should, if your drive is on the Barefoot Indilinx or SandForce platforms and you're running Windows 7—you shouldn't need to reformat to see new-drive performance. But if you are using an older SSD or a version of Windows that predates Win7, your drive will slow down significantly with use. If your drive doesn't have Trim, your manufacturer's website should have a wiper utility available. If you're one of the few super-early adopters with a Trim-less drive and no available wiper utility, there are third-party options, or you could just completely zero the drive.

We use Diskpart.exe, a Microsoft utility that ships with Windows, to completely wipe the drive by writing zeroes to every sector on the disk. This irrevocably erases all your data, so make sure important things are backed up. (And, of course, you can't run it on your boot drive, so you'll need another Windows computer). To use it, open an administrator command prompt (by right-clicking on cmd.exe and selecting Run as Administrator). Type `diskpart` at the prompt and hit Enter. Once in diskpart, type `list disk`. Find your SSD in the list, then type `select disk x`, where x is the number of the disk (here, we chose `select disk 1`). Type `clean all` to completely zero every sector of the disk. After this you'll need to reinitialize and repartition the drive, but it should perform as new.

Why Is USB So Slow?

Recently, I tried to copy all the data from a 200GB external drive to an internal drive on my machine. Quick math for USB 2.0 tells me that it should take a little over an hour to copy. Three hours later, it's barely a third of the way done. Now I'm questioning if my Gigabyte EX58-DS4 motherboard has USB 2.0 at all. On boot I can see during the POST that there are two USB 2.0 and six USB 1.1 ports; Device Manager reflects the same with two Enhanced host controllers and six Universal host controllers. I would expect everything to be USB 2.0 on a new(ish) system. How can I get everything to go full speed? Is there a BIOS setting, or firmware update, or some little switch I need to toggle? Short of a fix, how can I tell which ports are actually working at 2.0 speeds?



Diskpart is a low-level utility that will completely erase drives; we use it to restore SSDs to like-new condition.

With USB 3.0 around the corner, will we see much change in speeds when copying from an external drive between USB 2.0 and 3.0, or are the drives themselves becoming the limiting factor?

—Brandon Francey

Brandon, although any USB 2.0 port will work with a USB 1.1 device, your Socket 1366 Gigabyte board shouldn't have any USB ports that are limited to USB 1.1 speeds. That said, the maximum transfer speed you'll achieve from a USB 2.0 drive is around 33MB/s. Even if you're hitting the maximum transfer speed the whole time, which is unlikely, transferring 200GB of files will take close to two hours. Depending on the file sizes, it could take much longer, and other variables—such as cable length, cable quality, the hub you're on, and the external hard drive con-

troller chip—could also have an effect. So it's possible you are running at USB 2.0 speeds.

You can expect file transfers over USB 3.0 to be significantly faster than transfers over USB 2.0, because USB 3.0 has much higher bandwidth—5Gb/s compared to 480Mb/s for USB 2.0. Over USB 3.0, your transfer speed should be closer to the speed of the raw drive, while USB 2.0 is limited in practice to around 33MB/s. We've seen 80MB/s reads and 66MB/s writes from external mechanical drives using USB 3.0, and we've had USB 3.0 SSDs hit 180MB/s. Faster drives will have faster results, as no current storage spec has transfer speeds close to USB 3.0's theoretical maximum.

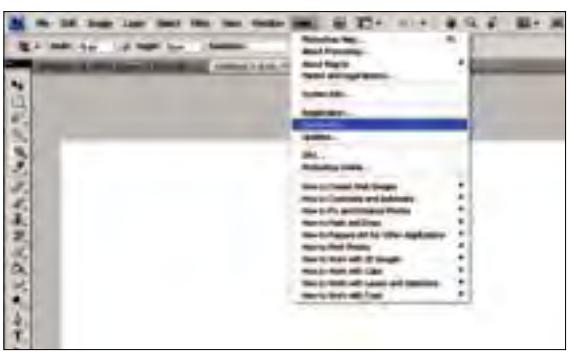
IF YOUR SSD PREDATES THE TRIM COMMAND, IT WILL SLOW DOWN SIGNIFICANTLY WITH USE

Viruses Survive Reformat?

A friend and I were having an argument about viruses. He says that even if I partition and reformat my hard drive, the viruses will still be there because reformatting does not erase the threat of the virus. I say that reformatting will remove the threat of the virus. Who is right?

—Edward Jones

Generally, yes, it would be very difficult for the typical virus, trojan, or other malware to survive a reformat. But never say never. If the malware is, say, hiding in an HPA, or Host Protected Area—a hidden partition on your hard drive—a general format would not touch it. You would have to unhide the HPA using a tool such as HDAT2, and then wipe the drive. If your system actually has a BIOS that's infected, the BIOS could reinfect the system and that would withstand a reformat. This isn't just theory, either. Some security products that are used to recover stolen PCs will reside in the BIOS. So if the thief reformats or even swaps the drive, the BIOS would reinstall the tracking software.



It's important to deactivate your Adobe products before you uninstall them, so you can reinstall them on your new build.

There are even theoretical infections that could hide in your videocard's firmware, or that of other add-in cards.

Still, the chance of you having a virus that propagates itself via the BIOS is pretty low. Your machine is more likely to get reinfected from an infected USB key or via the network during the reinstall.

Deactivating Creative Suite and Office

In your May 2010 issue you advised a reader to deactivate their old Adobe install before an OS upgrade. How do I deactivate an Adobe product? Could I apply the same procedure to Microsoft Office Student Edition? I already have it installed on three computers and on one of them I want to replace the existing HD with one of a larger capacity.

Last question: I have an Intel DP45SG motherboard and Windows Vista Ultimate 64-bit, 8GB of DDR3, and two Seagate 1TB HDDs running in RAID 1. The BIOS is the most recent upgrade from Intel. I would like to have the AHCI activated for the HDD. I did it in the registry as per your instructions in a previous issue, but in the device manager the drivers are listed as "disk.sys," "partmgr.sys," and

SUBMIT YOUR QUESTION Are flames shooting out of the back of your rig? First, grab a fire extinguisher and douse the flames. Once the pyrotechnic display has fizzled, email the doctor at doctor@maximumpc.com for advice on how to solve your technological woes.

nothing else. Intel says that RAID 1 automatically activates AHCI for the HDD in the BIOS when set to RAID, but the driver is not loaded. Is it possible that AHCI is a legacy item and 64-bit Windows does not support it?

—Akos Feket

First question first, Akos. To deactivate an Adobe product, launch it and go to the Help menu, then click Deactivate. Be sure to do this before you uninstall the product! For Microsoft Office, it will automatically deactivate provided you uninstall Office via Add/Remove Programs in the Control Panel. Once the uninstall is finished, you'll be prompted to restart. That's it!

Now, to your other question. AHCI functionality is not a legacy item, and 64-bit Windows does include it. The AHCI commands are a subset of the RAID setting, so if you're running RAID on an Intel chipset, as you are, AHCI is already enabled.

What Now?

I'm about to build my first computer and I have all the information about how to put it together—but then what? What should I do after assembly but before gaming? I have searched and searched but every article I read about building a computer stops at the completion of assembly. I know I'm going to install the OS, but what do I do after that? There must be some critical things to accomplish and vital programs to be installed before I use it normally, right? Can you help?

—Yancy Prokulewicz

Once your computer is assembled and your OS is installed, you're nearly ready. Depending on your OS, you'll need to install several drivers. Windows 7 has excellent native drivers for most things, but you'll want to install at least the following: the latest drivers for your graphics card and the latest chipset drivers, SATA drivers, and network drivers for your motherboard. Now is also a good time to pick up a decent antivirus program—if you're running a legit copy of Windows, we suggest Microsoft's free Security Essentials (http://bit.ly/lo2Q2). And while we have your attention, why not peruse our lovely list of 32 essential apps and utilities for your new PC (http://bit.ly/dA3NCG)? It's like we made it just for you, Yancy. Just for you.

Physical Hardware Audit?

I can easily find out the total amount of physical memory on my computer, but is there a way to determine how many different sticks of memory are installed without taking the computer apart and looking at the motherboard? I know I have 3GB of RAM installed, but is that three 1GB DIMMs, or some other configuration? Device Manager doesn't seem to be able to tell me details like the memory manufacturer, parity, number of DIMMs, etc.

—John in Raleigh

John, there are several utilities that will go in-depth to identify the hardware your computer is running. CPUID's CPU-Z (www.cpuid.com) is a classic—you can find the total memory count under the Memory tab and the details for each slot under the SPD tab. We've also been digging on Piriform's Speccy (www.speccy.com), which has a slightly prettier interface. You'll find the info you're looking for (including CAS latencies, manufac-

Any 5000-series ATI Radeon HD videocard, like this 5850, will be able to support three monitors, thanks to ATI's Eyefinity technology.

turer, and number of DIMMs) under the RAM tab in the left-hand menu.

Upgrade My CPU or Just My GPU?

I have an AMD Phenom X4 9850 on an Asus CrossFire motherboard, a Palit GeForce 9600 GT GPU, and 4GB of RAM. I'm thinking of a DirectX 11 videocard upgrade. In the past, I have typically upgraded the entire PC rather than just the videocard. Does this approach still make sense?

Would a new ATI Radeon HD 5850 or a comparable Nvidia videocard (GTX 285?) run acceptably or would I need to upgrade my CPU to run DirectX 11 games? At what point in general do you need to upgrade your CPU to keep up with the GPU technology? Is there a general rule?

A completely different question: My current 9600 GT supports two monitors. I happen to have three monitors. I would like to upgrade my current PC to be able to use all three monitors. I have recently seen Nvidia 8600 videocards on sale for as low as $30. If I were to buy one of these and throw it in my current rig, could I use three monitors?

—Brad Poor

What to upgrade very much depends on what you do, Brad. If you are primarily a gamer, you are better served by a GPU upgrade. The system you have certainly sounds like it can go through one more upgrade cycle before being decommissioned. The 9600 GT is a severe dog next to today's budget cards such as the new GeForce GTX 460. If, however, you're not a gamer and you find that your video encodes or photo editing is unbearably slow, moving to an Intel processor (and board) isn't a bad idea. It's possible you could upgrade your AMD CPU, but you'd want to first check your motherboard manufacturer's website for the chip support on your board. Since that's a pretty old board, the odds are against it working with a Phenom II X4 or X6—but you never know, so check online first.

As far as your videocard question, an ATI Radeon HD 5850 would give you acceptable DX11 support with your current setup and support three monitors, to boot, in Eyefinity mode. The cheaper route, as you say, would be to just run an 8600 alongside the 9600 GT, but then you're that much more committed to tired old technology.

Finally, is there a general rule as to when to upgrade your CPU because it falls too far behind the GPU? Not that the Doctor is aware of. That's because many different factors have to be accounted for, including which games you want to play and at what resolution.

BUILDER'S Creed

Whether you're an Italian renaissance cosplayer or a Starcraft II addict, you'll love our $1,400 gaming rig. Parts, prices, and procedures inside!

BY GORDON MAH UNG

How do you know when it's time to replace your gaming rig? When you've turned down all of the game settings to minimum and you still have to play at 1024x768. Or you've just completed the Steam hardware survey and Valve rejects your score because it'll drag down the curve. Of course, if you're asking the question in the first place....

In spec'ing this year's gaming build, we decided to restrict ourselves to a budget of approximately $1,400. This would provide a nice challenge, but would still give us enough cash to build a powerful and feature-filled machine. If you've ever tried to squeeze high-end performance into this price point, you already know that the road to our final configuration wasn't clear, obvious, or easy.

The truth is that there are many ways to skin a Tribble, and there is no single right config for everyone. To give you some insight into how we arrived at our final destination, we're going to walk you through our decision-making process.

Dressing up as Ezio from *Assassins Creed 2* before PC assembly is optional.

PHOTOGRAPHY BY SAMANTHA BERG

FOUNDATION FIRST

Initially, we decided the foundation for our configuration should be an LGA1366 board with a Core i7-930. We reasoned this would give us the ability to run a quad-core now, and then upgrade to a hexa-core in the future.

When we pondered this a little more, however, we reasoned that maybe the LGA1366/i7-930 route wasn't the best choice for a balanced gaming system. The CPU costs nearly $300, and you have to pay for a third DIMM to keep its tri-channel memory stoked. Furthermore, LGA1366 boards tend to cost $50 to $100 more than LGA1156 mobos. The final blow? As much as we love six-core computing, it's not essential for gaming. Not yet, at least.

With this in mind, we shifted our focus toward Intel's LGA1156 platform, which permits a much wider range of processor choices that scale all the way down to $113 Core i3 CPUs. Our first inclination was Intel's 2.93GHz Core i7-870 chip. Recent price cuts from $562 to $294 make this powerful quad-core with Hyper-Threading mighty appealing. In raw performance it actually comes surprisingly close to Intel's original Extreme Edition chip, which sold for $999.

GOOD TO GO, RIGHT? WRONG!

The more we considered the possibilities, however, the more we started to wonder: Given the gaming orientation of this rig, did we really need to pay for Hyper-Threading? Probably not. If you look at any survey of gaming hardware, the vast majority of users are still happily humming along with dual-cores. (We actually considered making this rig a dual-core at one point, but hey, even gamers like to occasionally transcode videos.)

In the end, we picked Intel's new 2.8GHz Core i5-760. AT $205, the chip gives us four cores but lacks Hyper-Threading. We're going to pull extra value out of the CPU by overclocking the crap out of it.

Corsair's Force F60 gives our rig the responsiveness of an SSD.

Cooler Master's special edition HAF 922 is a great DIY case, and it looks nice, too.

FINALLY: SSD IN A MIDRANGE PC

Trimming the hundred bucks from our CPU cost and going with LGA1156, gave us more money to play with, which allowed us to do something we've never done in a budget gaming rig: add an SSD.

Why SSD? If you haven't kept up with current events, the simple answer is that they absolutely kick ass. System builders and upgraders who make the leap are shocked at the speedy boot times, and SSDs are ideal for gaming because they shorten level load times to near-zero.

Of course, the $1,400 question is: How much SSD can you fit into a budget gaming rig? About 60GB. That's what we got with Corsair's Force F60 and it only set us back $160. The drive uses the much-beloved SandForce controller, which enables performance that pretty much tops out the SATA 3Gb/s interface. The SSD isn't the only storage in the system, of course—we also include a 1TB Seagate 7200.12. It's pretty fast itself, and is a perfect storage drive.

CPU COMPROMISE?

As always, we double-checked our decision. Did SSD really make sense? After all, couldn't we take that $160 from the SSD and put it toward the fattest GPU possible? Well… yes and no. A balanced system isn't about one single component. We could have, say, poured a ton of the budget into the CPU or GPU. But that would have been a bit like putting a big-block motor into a Miata.

In the end, the GeForce GTX 470 fits our needs well. At $289 before a $20 mail-in rebate, Asus's ENGTX470 is one hell of a deal. Why not a single GTX 460 1GB? As fantastic as that card is for the money, we're getting a lot more videocard for just $50 more. We also considered two GTX 460s in SLI but that would have meant spending almost a third of our budget on graphics alone.

That doesn't mean we weren't biting our lips over our decisions. For example, we could have actually saved coinage by selecting the black Cooler Master HAF 922 and the bundled 600-watt PSU. On the street, this power supply sells for $160, but it lacks the juice to run SLI'd GTX 470 parts. In fact, it lacks the ability to even run SLI'd GTX 460 components. Better to pay for a quality PSU like Corsair's TX750. This gets you approved SLI support for GTX 460 and GTX 470 cards.

Yes, we opted to pay more for a red case. That might seem a little frivolous after all our deliberating over parts. At the end of the day though, we decided that even though we were building a budget box, we still wanted a little panache. Something to let fellow gamers know that we didn't just pick the lowest-price box and click "add to cart." Call us reckless and irresponsible, but we went crazy and splurged $50 on the special edition red HAF 922. The case's two-tone red and black design is a head turner, and it's also a gem of a case to build in.

What's in Our $1,400 Gaming Rig?

Budget and gaming go together like oil and water but we're happy with our gaming rig. You get one of the most powerful DirectX 11 cards out today, an upgrade path that supports SLI (with a PSU to run it), and the responsiveness of a SandForce-based SSD.

CHILL OUT

Cooler Master's Hyper 212+ has long been a *Maximum PC* favorite for giving us cooling performance that rivals heatsinks twice its price. Even though our Core i5-760 CPU came with a cooler, we're ditching it for the Hyper 212+ so we can achieve higher stable overclocks.

SLI-READY

The **Corsair TX750** can be easily found for less than $100 and is rated by Nvidia to run two GTX 470 cards in SLI. That gives us a solid upgrade path for a second GPU when prices drop. We oriented the TX750 so that its bottom-mounted fan sucks air in and vents it directly out the back.

LEAVE IT TO THE PRO

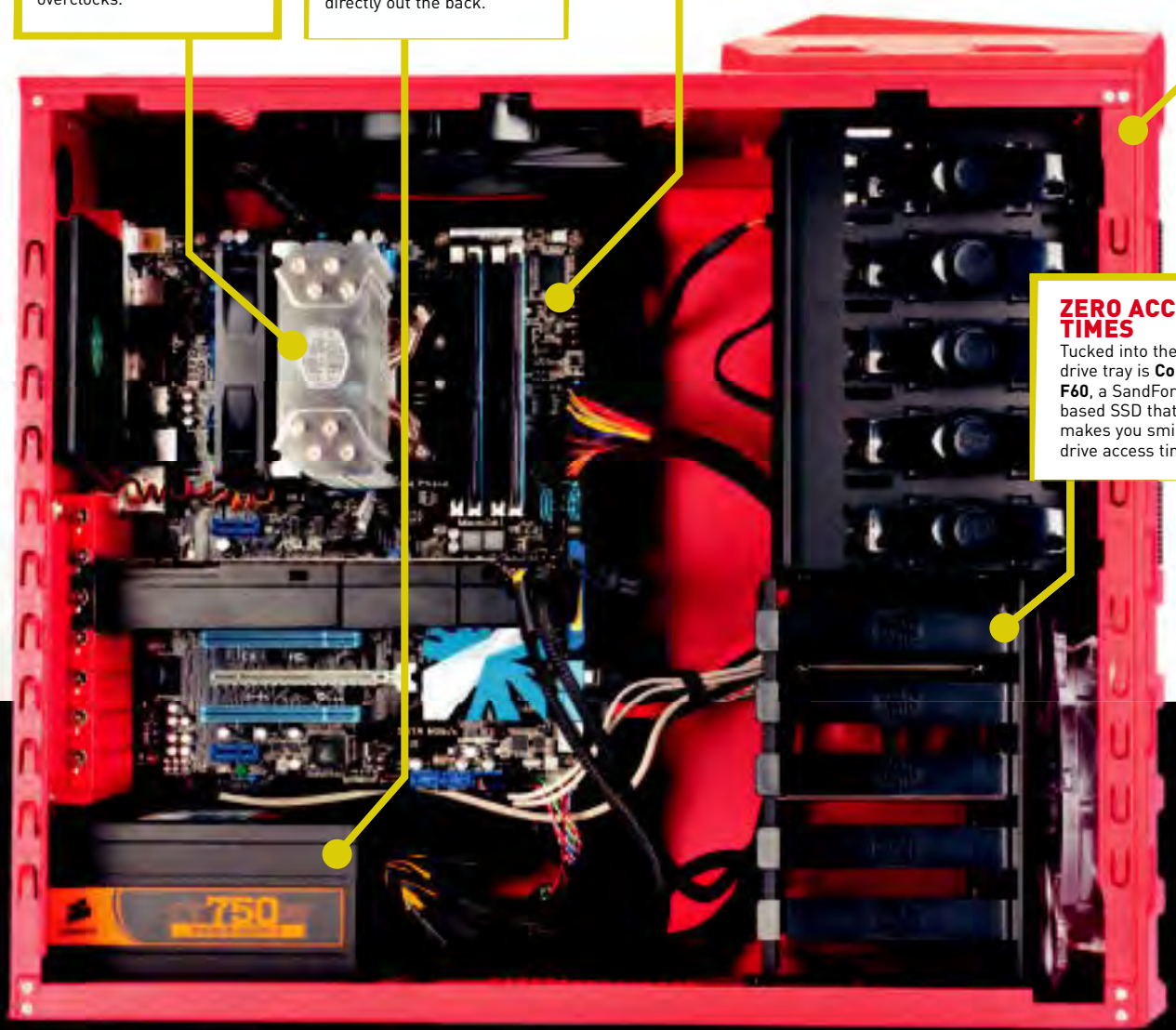
Some P55 boards in multi-card mode are known to have issues with SATA 6Gb/s and USB 3.0, but **Asus's P7P55D-E Pro** should be less problematic. That's because the P7P55D-E Pro uses a chip to help alleviate congestion in the P55 chipset.

RED HOT

The special-edition red **Cooler Master HAF 922** case was an extra expense, but we decided that its striking two-tone look and spacious interior made it worth the stretch.

ZERO ACCESS TIMES

Tucked into the hard drive tray is **Corsair's F60**, a SandForce-based SSD that makes you smile at drive access times.



THE BUDGET GAMING PC PARTS LIST

	PART	URL	PRICE
CPU	Intel Core i5-760	www.intel.com	$209
Cooler	Cooler Master Hyper 212+	www.coolermaster.com	$30
RAM	4GB Corsair DDR3/1333	www.corsair.com	$99
Mobo	Asus P7P55D-E Pro	www.asus.com	$159
GPU	Asus ENGTX 470	www.asus.com	$289
Optical Drive	Samsung SH-S223F	www.samsungodd.com	$23
Hard Drive	1TB Seagate Barracuda 7200.12	www.seagate.com	$74
Solid State Drive	Corsair Force F60	www.corsair.com	$160
Case	Cooler Master Red HAF 922	www.newegg.com	$139
PSU	Corsair TX750	www.corsair.com	$90
OS	Windows Home Premium 64 (OEM)	www.microsoft.com	$99
TOTAL			**$1,371**

DEPT. OF STORAGE EFFICIENCY

How to Live on a 60GB Boot Drive

With hard drives now reaching 3TB, it's pretty hard to go back to a 60GB boot drive. But for people who like the sound of 250MB/s read speeds and damn-near-zero access times, it's well worth scaling back. Here are a few tips to help make a smaller SSD work effectively as a boot drive:

DISABLE HIBERNATION Hibernation writes what's in memory to a file on your hard drive. Unfortunately, if you have 4GB of RAM, it will take up 4GB of space. If you have 8GB, it'll eat 8GB. Since most people on desktops don't run hibernation—they run standby instead—you can probably live without hibernation enabled. To turn it off, spawn a command prompt with administrator rights by typing cmd in the search bar of Windows 7 or Vista and right-clicking it. Select Run as Administrator. At the command prompt, type `powercfg -h off` and close the window. Reboot and the hibernation file should be gone.

Disk Cleanup for (C:)
Disk Cleanup
More Options
Programs and Features
You can free more disk space by removing programs that you do not use.
Clean up...
System Restore and Shadow Copies
You can free more disk space by removing all but the most recent restore point.
In some editions of Windows, the disk might include file shadow copies and older Windows Complete PC Backup images as part of restore points. This information will also be deleted.
Clean up...

Turning off System Restore or cleaning up restore points will save you a whole lot of storage space.

DISABLE SYSTEM RESTORE Windows' ability to create restore points can be helpful in a pinch but it's also a big space suck. And while it does sometimes save your bacon, it also often can't do jack when your OS gets broken or infected. To disable it, right-click My Computer. Select Properties. Select System Protection and then click Configure. Now click Turn off System Protection and reboot. If you want to leave System Protection on, but still shave off some gigabytes, double-click My Computer. Right-click the C: drive and click Properties. Click Disk Cleanup, and then More Options. Select Cleanup under the System Restore heading.

STEP 1 PREP THE CASE

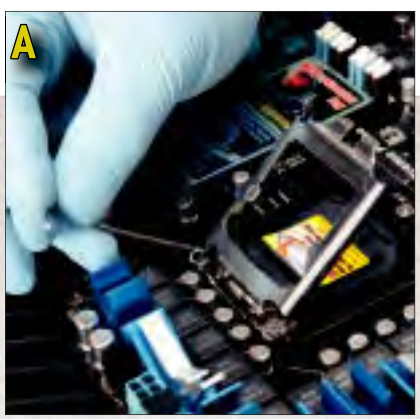
The first thing we do to get our red Cooler Master HAF 922 ready for the build is to install the brass motherboard standoffs in the case (image A). A few standoffs are already installed, but you'll have to install the rest. To do this, carefully hold your motherboard above the case and eyeball where to install mounts. Ideally, one standoff should be installed for each mounting hole in your motherboard. Hand-tighten them first, and once they're in place, use a pair of pliers or a small wrench to tighten them down. Torque them down enough so they don't back off when you need to remove the motherboard.

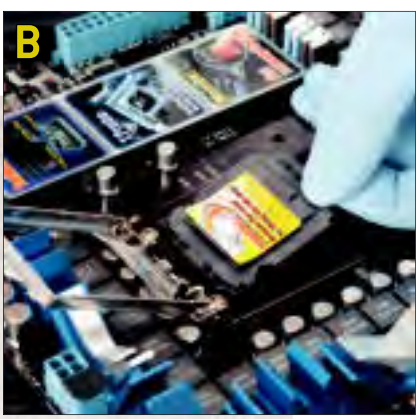
Now, install the I/O shield (image B). These rectangular metal panels cover your I/O ports such as USB, LAN, and keyboard, and are matched to your motherboard. Your board should have come with one in the box. For some strange reason, some cases come with I/O shields already in place. If this is the case in your… erm… case, you'll need to remove this first and pound yours in. Use the back of your screwdriver to pop it out by hitting from the outside of the case, and then pop your I/O shield in place.

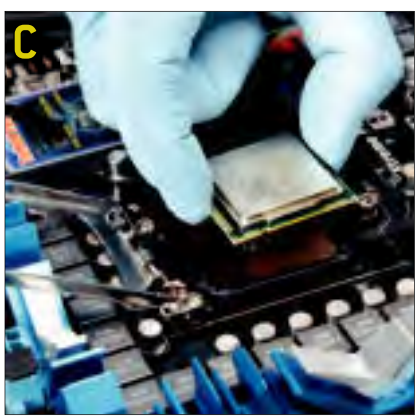
STEP 2 INSTALL THE CPU

Since our case does not have a removable motherboard tray, we're going to add several components with the mobo out of the case. With the motherboard on a flat surface, unclip the arm that holds the CPU load plate in place and flip back the arm (image A). This will lift the load plate out of the way. You'll now need to remove the protective plastic tab that covers the pins in the socket. The one Asus uses requires that you remove it from one side first (image B). Others may need you to grasp it on both sides. Do not throw this plastic tab away! If you need to return the board to the store or manufacturer, they will not accept it without the tab in place. Do not touch any of the gold contacts in the socket, either—bending one may kill the motherboard.

Install the CPU by holding it parallel to the socket and carefully lowering it in place (image C). Notice the two notches in the socket that should line up with the two notches in the CPU. With the chip in place, fold the load plate in place and lock the arm.

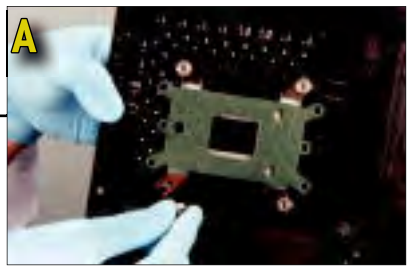






STEP 3

INSTALL THE HEATSINK



Our CPU came with a stock Intel cooler. It's fine at stock speeds, but we chose the Core i5-760 with overclocking in mind. To accommodate the increased heat, we chose to use Cooler Master's Hyper 212+. At $30, it yields performance that rivals some heatsinks more than twice its price.

The first step in installing this cooler is to mount the backplate on the board. You'll be putting a screw in through the front of the board and then tightening a nut to it on the back of the board (image A)—a special tool comes with the heatsink to aid with tightening the nut. Once the backplate is in place, we'll carefully apply some thermal compound (it comes with the heatsink) on the CPU's heat spreader (image B). We just place a few BB-size bits on the chip and use the tip of the syringe to spread it evenly around the metal top.

The heatsink ships with the fan attached. You'll need to remove the fan by gently bending the clips that grip the heatsink. The Hyper 212+ works with multiple sockets and the X-shaped adapter comes from the factory set for LGA775. To set it for LGA1156, you need to pull up each of the spring-mounted screws and slide them to the middle hole. Now, take the adapter and slip it inside the heatsink. Next, screw down the heatsink using a cross-star pattern (image C).

Once the heatsink is in place, you need to also install the fan. But before you do that, put some thought into the airflow of your case. Do you want the air to be sucked into or blown out of the rear? You can easily reverse the flow by dismounting the case fan and heatsink fan. The industry standard is to exhaust air out through the rear fan, but there is a good argument for sucking in cool, exterior air and blowing it over the CPU first. With the HAF 922, you can run either way.

Let's finish the installation by popping the fan assembly onto the heatsink (image D). Finally, plug the fan into the header marked "CPU."

STEP 4 INSTALL RAM

The P55 chipset and Core i5 feature dual-channel memory support. That means you need to have RAM that's the same size and speed, and install it in the correct RAM slots. The most common memory-installation mistake is to put the RAM in the wrong slots, thereby configuring the board for single-channel. The second-most common mistake is putting the memory in the inner pair of slots. That works for LGA775 and AM3 boards, but do so on a Core ix and it probably won't boot.

On this board, we put the RAM in the two slots shown in image A. When you know where to install your RAM, match the notch in the RAM with the notch in the slot and gently push it into place with pressure on the outer corners until it locks in place (image B). You usually hear a click, but sometimes you may not. Make sure the arms that hold the RAM are securely in place, as well.

STEP 5 INSTALL THE MOTHERBOARD

With our RAM, CPU, and heatsink in place, it's time to install the motherboard. Not that you didn't follow our instructions, but you did install the I/O shield, right? If you haven't, now is a good time to do it. This Asus board uses a snag-less design, but many other boards continue to use cheap metal shields. Make sure the little metal arms in the I/O shield are bent upward, so the mother-board can be installed without the arms blocking the ports. Once the shield is in place, bend the metal fingers until they make contact with the top of the metal cage that holds the ports.

OK, now gently lower the mobo into place (image A). We installed nine motherboard standoffs in the case. All nine should line up with the mounting holes in the motherboard. If you installed nine standoffs and you only see room for eight screws, this means you have one of the standoffs installed in the wrong place. That means the bare metal standoff could be poking into a spot on the board, which could potentially short something out. In this case, you will need to remove the board and locate the one standoff that is in the wrong spot.

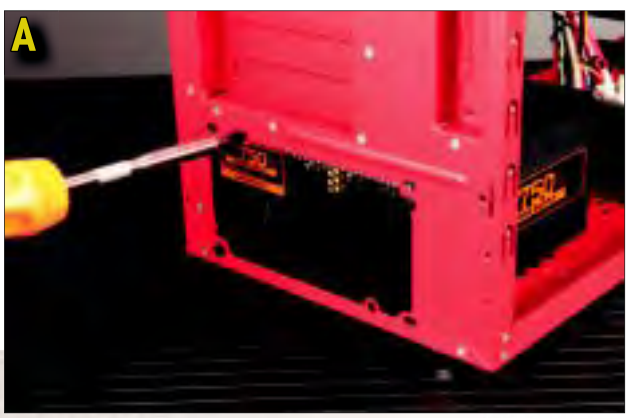
Back to the installation. Tighten down all the screws to hold the board in place (image B). The spacing should be fine but if you find that it is difficult to install add-in cards, you may have to loosen the screws and move the board away from the back of the case. The board won't move much, but the tiny bit of wiggle room may be just enough to allow you to install the cards.

STEP 6

INSTALL THE GPU AND PSU

We're in the home stretch of our build and are almost ready to power her up. But you can't do that without a power supply. This hasn't changed in years—four screws hold the rectangular power supply to the case (image A). Lately, though, many cases feature mounts that let you orient the PSU upside down if you choose to. For PSUs with fans that suck air in through the front, this doesn't really matter, but for power supplies with bottom-mounted fans, you can mount them so that they pull air in from either the top or the bottom. The HAF 922 case has external vents that allow the PSU to both suck outside air in and also vent hot air out of the case, so that's what we're doing.

The GPU should be mounted in the top full-length x16 PCI-E slot. Hold the card parallel to the slot and carefully push it in place until it locks (image B). If the rear of the card will not fit, check the fit near the rear slot covers. You may have to either bend the metal slot cover slightly or shift your motherboard a tad if it will not go in.



DEPT. OF OVERCLOCKING

How We Overclocked a Core i5-760 to 4GHz

There are wild rumors that Intel may lock down overclocking on its new budget chips next year. Yes, you may be clock-blocked!

Thankfully, with existing chips there's no such barrier. So, to eke the most out of the budget quad in our gaming build, we decided to overclock it from its stock 2.8GHz all the way to 4GHz. Ah, now you understand why we spent the extra ducats on our Cooler Master Hyper 212+ over the stock heatsink fan.

So, how did we accomplish the overclock? The first step was to make the correct voltage tweaks. Interestingly, our Core i5-760 part didn't take too much crazy voltage to achieve a stable 4GHz. We set the CPU's voltage to 1.25, the IMC voltage to 1.15, DRAM voltage to 1.36, left the CPU PLL voltage on "auto," and set the PCH voltage to 1.0875. (If you're faint of heart, you may want to avoid voltage tweaks and just run the simple automatic overclock available in the board's BIOS.)

We then set the CPU ratio down one click from its default of 21 to 20 and cranked the block up to 200MHz from its stock 133MHz. Our target for the DRAM was a conservative 1,200MHz and the QPI was set for 6,407MHz.

Once configured, we stress-tested our rig overnight using our proprietary Maximum PC Lab stress test and a top-secret Intel stress-testing utility, and had no issues whatsoever.

STEP 7 INSTALL THE UMBILICALS

It's time to hook up the case's front USB and audio cables to your motherboard (image A). They are clearly marked "USB" and "Audio" and there should be no chance of mixing them up as they're keyed for slot entry. The HAF 922 does not have a front FireWire port, but if the case you're using does, make sure you are plugging it into the right header on the motherboard.

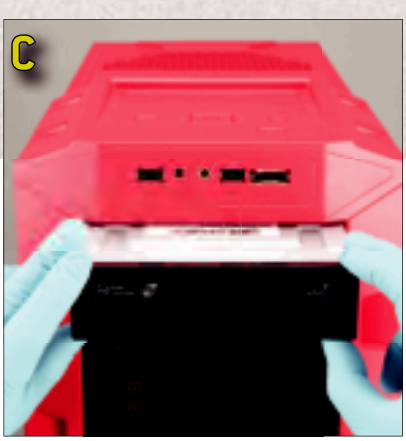
The Asus board includes a nifty all-in-one Q connector that allows you to plug the entire set of front-panel connectors into it (image B). This saves you the hassle of hunching over your case with a flashlight trying to figure out which one you got wrong. Go ahead and plug the Q connector into the motherboard. For the audio header, the HAF 922 provides an AC97 or HD Audio connector. You should consult your motherboard's manual to determine which one your board has—these days, it's usually HD Audio. The Asus board is compatible with both types, but you have to input which type you're using in the BIOS.

STEP 8 PUT IN YOUR DRIVES

The drive cage on the HAF 922 makes it a snap to install hard drives. Simply pull out a drive drawer, spread the cage, and put in your drive. Then slide the drive back into the cage and lock the arm in place (image A).

It used to be that you couldn't mount the typical 2.5-inch SSD without shelling out for a drive adapter, but today most ship with adapters. The Corsair Force 60 comes with the adapter already attached. Insert it into an empty tray (image B) and slide it back into the case. You don't have to worry about it being completely fastened down as there are no moving parts to damage in an SSD. Finally, remove one of the front bezels from the case, slide in your optical drive and lock it in place (image C).

While we're here, let's also plug in the SATA cables to the three drives. Most feature-packed boards have more than one controller for SATA. Ideally, you'll run most of your drives off the chipset's own south bridge. If you are running a SATA 6b/s drive on Intel hardware, however, you will need to run the drive on the board's discrete SATA 6b/s controller—on our board it's color-coded white. Plug your optical drive and the SSD into the mobo but leave the hard drive's SATA cable disconnected during the OS install. We've found that Windows Vista and 7 can get a bit wacky when more than one drive is attached during the OS install.



STEP 9

PLUG IN THE POWER CONNECTORS

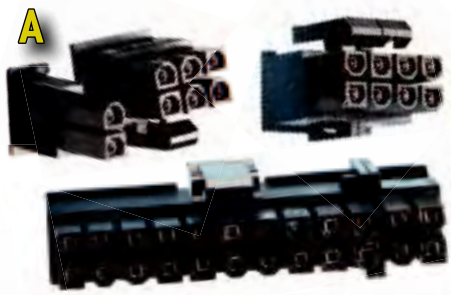
The final step is to power up all of your components. This is easy for an old pro but rookies can still get snagged on the process. Because of the different connectors used in boards, PSUs now ship with universal connectors that split apart. This eliminates the need to use an adapter but confuses the hell out of newbies.

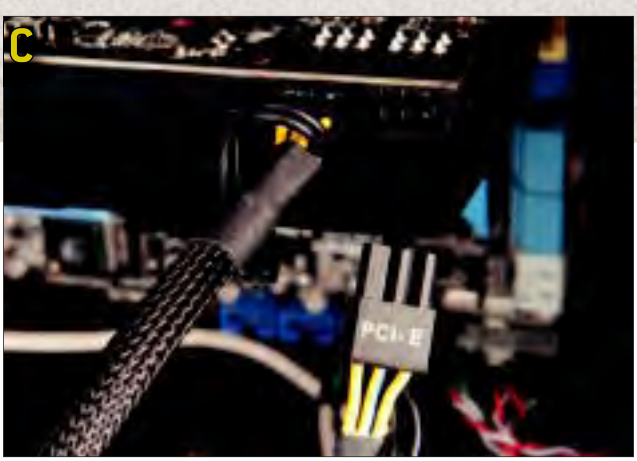
The Corsair PSU features convertible plugs (image A). On the top left is a 6-pin/8-pin GPU power plug. On the top right we have an EPS12V/ATX12V power plug (ATX12V in 4-pin configuration and EPS12V in 8-pin). On the bottom is the main power connector, which is convertible to 20-pin or 24-pin. These plugs convert by attaching or detaching the additional pins. On the GPU power plug, for example, to run it as an 8-pin you carefully line up the extra two pins and connect it to the corresponding port on the motherboard. Should you worry about plugging the pins in the wrong way? For the most part, no. The pins are keyed so as not to allow you to, say, jam your 8-pin EPS12V plug into an 8-pin GPU or vice versa.

You should also know that generally speaking, the convertible plugs are intended to be plugged into the same socket. Do not, for example, try to take your PSU's 20-pin main power connector and combine it with a 4-pin ATX12V plug. It probably won't fit, but don't even try it.

First, let's plug in the 24-pin main power connector (image B). The Asus board has a 24-pin plug, as most motherboards today do. Only very old boards still sport 20-pin connectors. Next, we'll plug in the 8-pin EPS12V connector. The Asus board, like many others, has a plastic cover that needs to be moved from half of the pins. If your PSU has an 8-pin EPS12V (our Corsair does), remove the cover and use the 8-pin plug. If your PSU does not, you can get by using just the 4-pin ATX12V. In fact, many boards will run fine with just the ATX12V plug. But if you are planning on heavy overclocking or other tasks that put a lot of stress on the CPU, we recommend that you run the full 8-pin connector.

Now, fish out two of the combo 6-pin/8-pin connectors and plug them into the GTX 470 card (image C). Finally, attach power to your hard drives (remember to leave your mechanical drive's data cable disconnected during OS install) and plug in the optical drive. The final step is to plug in the various case fans. You're now, as they say, good to go. Well done!





Troubleshooting Checklist

OK, maybe you're not really good to go, after all. Have no worries—we've distilled a quick drill for a system that will not POST.

✔ Is the power supply switch turned on?

✔ **Is the power supply plugged in firmly?**

✔ Is the power cable plugged into the wall?

✔ Is the monitor on?

✔ Is it plugged into the PC? (Hey, we have to ask.)

✔ Is the front-panel connector for the power switch wired correctly?

✔ Did you plug in the ATX12V/EPS12V? Failing to plug this in will prevent the system from POSTing.

✔ **Disconnect any 4-pin Molex connectors. These are easy to accidentally short out.**

✔ Do you have the RAM in the correct slots? RAM in the inner pair of slots in a Core *ix* rig may cause it not to POST. Remember to power down the PSU before you move RAM around.

✔ **Reseat RAM (with power off).**

✔ Reseat GPU (with power off).

✔ **Reseat the CPU (with power off).**

✔ Remove and reseat the motherboard and check for errant standoffs on the tray that may be shorting the system.

DEPT. OF WHAT NOW

The Best Way to Install Windows

So you pulled off the task of building your new PC and it POSTed on the first attempt. Now what? Believe it or not, there's actually a method to installing Windows and the associated service packs, patches, and drivers. Even with Windows 7. Here's how we do it in the Maximum PC Lab.

First, perform a standard installation of Windows. If you've never done this, simply put the install disc in the optical drive and the machine should boot to it.

After you've installed Windows, next install all the service packs and patches. Since most people don't have the patches downloaded, you will need to connect your machine to the Internet to download them. Windows 7 supports most network devices with native drivers, so you should be able to easily accomplish this task.

One thing to note: Make sure your box is hooked up behind a NAT—you do not want to hook an unpatched machine directly to the Internet because it will come under attack almost immediately. Also, do not do anything with the machine other than run Windows Update. Remember, the machine will have built-in vulnerabilities out of the box. Many people begin surfing around while downloading patches in the background. This is just patently not safe without proper antivirus protection and the latest security patches installed.

Once you have the latest patches or service packs installed, you should install the drivers for your board, load an antivirus application, and continue with your configuration and setup.

Finally, remember how we told you not to hook up the data cable of the secondary SATA drive? Now would be a good time to do this. Why did we recommend waiting in the first place? We've seen the Windows boot loader get quite wonky when it sees multiple drives to install the OS to. One time, on a two-drive machine, we watched Vista install the system volume on one drive and the OS on the other. This would mean that one day, if you removed the secondary drive, the machine would stop booting.

THE FINAL ANALYSIS

Our Budget Build in Action

Can a $1,400 rig take on a $2,000 and $2,500 machine?

When it came time to benchmark our budget gaming PC, we knew it wasn't going to be easy. Our standard zero-point rig is, after all, designed to measure up to powerful $7,500 custom gaming rigs. The zero-point remains pretty state of the art, with a 2.66GHz Core i7-920 overclocked to 3.5GHz, 6GB of DDR3/1333 running at 1,750MHz, an Intel 160GB G2 SSD, and an ATI Radeon HD 5970. Hell, the dual-GPU card in our zero-point costs half as much as our entire gaming system did.

So, how did our $1,400 gaming machine fare by comparison? Not bad, actually.

In our standard benchmark suite, the zero-point's Hyper-Threading (and perhaps the third channel of DDR3) helped it win a decisive victory in Sony Vegas Pro 9. But the superior clock speed of our budget gaming machine gave it the upper hand in the mostly single-threaded Lightroom 2.6 benchmark. The zero-point and gaming rig drew a near stalemate in ProShow and MainConcept's Reference, with our gaming build running 4 percent faster in ProShow and 6 percent slower in Reference.

In gaming performance tests, it wasn't much of a contest as the budget gaming rig lagged behind our zero-point by 34 percent in STALKER: CoP and 37 percent in Far Cry 2. No surprise here—a battle between a $290 GPU and a $700 GPU can end only one way, particularly when you consider that our benchmarks run at 2560x1600 resolution.

That's not to say our rig is a disappointment. Remember, most people are not going to be gaming on a 30-inch panel. At 1920x1080, this system will give you excessive happiness for at least a couple of gaming seasons.

A DIFFERENT PERSPECTIVE

For another point of comparison, we pitted new Predator system (see review on page 78). Based on a 2.8GHz Core i7-930, 12GB of DDR3/1333, and a GeForce GTX 470, this $2,000 machine was a bit closer in specs.

In this arena, the budget gaming rig fared quite well. It beat the Acer Predator on every single benchmark—sometimes by very large double-digit percentages, thanks to the Corsair Force 60 SSD and the 4GHz overclock.

But in a wake-up call for those who maintain there is no value in Hyper-Threading, peep our Sony Vegas Pro 9 test. Despite the blazingly fast SSD and a *1.2GHz* clock advantage, the budget gaming rig was only 5 percent faster than the Predator. Those virtual cores in the Core i7-930 definitely come in handy with highly multithreaded tasks.

Budget Gaming Machine vs. Zero-Point System

	ZERO POINT	
Vegas Pro 9 (sec)	3,069	3,660 (-17%)
Lightroom 2.6 (sec)	356	2
ProShow 4 (sec)	1,112	1,071
MainConcept Ref 1.6 (sec)	2,113	2,250 (-6%)
STALKER: CoP (fps)	42	27.9 (-34%)
Far Cry 2 (fps)	114.4	72.6 (-37%)

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our current desktop test bed consists of a quad-core 2.66GHz Core i7-920 overclocked to 3.5GHz, 6GB of Corsair DDR3/1333 overclocked to 1750MHz, on a Gigabyte X58 motherboard. We are running an ATI Radeon HD 5970 graphics card, a 160GB Intel X25-M SSD, and 64-bit Windows 7 Ultimate.

Budget Gaming Machine vs. Acer Predator

	ZERO POINT	
Vegas Pro 9 (sec)	3,832	3,660
Lightroom 2.6 (sec)	443	253
ProShow 4 (sec)	1,445	1,071
MainConcept Ref 1.6 (sec)	2,728	2,250
STALKER: CoP (fps)	25.1	27.9
Far Cry 2 (fps)	69.9	72.6

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

The Acer Predator features a 2.8GHz Core i7-930, 12GB of DDR3/1333 on an X58 chipset motherboard, an Nvidia GeForce GTX 470 GPU, and a 1.5TB Western Digital 7,2000rpm hard drive, running the 64-bit version of Windows 7 Home Premium.

Seizing on the latest graphics trend, new 3D laptops and monitors arrive en masse. Are they ready to slay their 2D counterparts?

BY KATHERINE STEVENSON AND AMBER BOUMAN

LET THE 3D BATTLE BEGIN

3D is everywhere these days. From new TVs to Hollywood blockbusters to gaming consoles, the technology, which has been around for ages, is now poised to give consumers a more immersive, in-your-face form of entertainment in the home. And the PC is no exception. In fact, it's a natural fit. The PC games we've been playing for years are already rendered with a 3D engine—stereoscopic technology and a suitable set of glasses just bring them to life. Newer games will only optimize that potential. Add to this a spate of Blu-ray 3D movies coming down the pike and you can see why the PC is well within the clutches of this latest trend.

Sure enough, a cadre of new 3D laptops and monitors make it possible for you to enjoy stereoscopic content both on your desktop and on the go. The vast majority of these offerings rely on Nvidia's 3D Vision kit—a set of powered shutter glasses, a USB-connected IR emitter, and the appropriate drivers—which, when paired with the right GPU (a GeForce 8 series or newer) and a 120Hz screen, provide an "active" 3D experience. In other words, as a rapid succession of alternating screens presents slightly different views to each eye, the shutter glasses ensure that the correct view is seen by the correct eye by shuttering the opposite lens accordingly.

Passive solutions for the PC also exist. These rely on polarized screens and glasses, which help resolve a double set of images shot from slightly different angles by filtering out one image for each eye and thus creating the illusion of depth.

Besides these major distinctions, there are several other points to consider before investing in a 3D experience for your PC. Our reviews of several new 3D laptops and monitors will help educate you on what's out there and what kind of features to look for to meet your 3D needs.

Origin EON15-3D

For folks who have no interest in 3D movies

Newcomer Origin made an impressive debut with its Genesis desktop system in our August issue, so we were anxious to see what it could do with a 3D gaming laptop.

We received the company's very first 3D model—the unit it demoed at this year's E3 gaming expo. In that context, the choice of hardware makes a lot of sense. This 15.6-inch EON15-3D sports a GeForce GTX 285M—arguably the burliest mobile graphics card available. Certainly better than the GTX 260M in our zero-point rig and quite capable of hitting a playable frame rate on a 1680x1050 external display (up from the unit's native 1366x768) with lots of visual effects enabled—in non-3D conditions, that is.

To achieve 3D, the EON15-3D uses Nvidia's 3D Vision emitter, shutter glasses, and 120Hz screen. Enabling 3D is simply a matter of entering the Nvidia Control Panel, selecting Enable Stereoscopic 3D, and completing a straightforward setup wizard.

y games is vast, oth of our gaming ng "Excellent" 3D Vision support. But while the 3D effects in Call of Duty 4 and Far Cry 2 are certainly noticeable, we weren't particularly captivated by the experience. Newer games developed with 3D Vision in mind—Just Cause 2 and Mafia II being two prime examples—make for a more compelling experience.

l, because 3D opy requires that twice as many screens are generated, one for each eye. With 3D enabled, we saw our Call of Duty frame rate drop from 68.87 at a res of 1680x1050 to 39.1 at 1366x768. We wanted to test the laptop with one of the large 3D he EON15-3D is the only laptop that has the necessary dual-link DVI-out (which could also come in handy for a 30-inch display). Unfortunately, the port would only output at single-link throughput—a snafu Origin attributes to the earliness of our build. We did, however, verify that the laptop could display 3D content using a 120Hz 3D projector via HDMI.

Gamers will appreciate the EON15-3D's GeForce GTX 285M.

That would be a great way to display Blu-ray 3D movies, if only the EON15-3D supported them. While the GTX 285M provided some of the strongest gaming numbers in this roundup, the card is not compatible with Blu-ray 3D playback (Origin also offers a Blu-ray 3D–compatible GTS 360M option). You can still play regular Blu-ray movies on the laptop's BD-ROM/DVD combo drive.

The EON15-3D's other attributes include a quad-core Core i7 proc, a 500GB Seagate Momentus XT hybrid drive, and 4GB of DDR3/1333 RAM. Physically, the machine is surprisingly unadorned for a gaming rig, but the matte-black body is solid with a big keyboard, full number pad, and a lots of connectivity options.

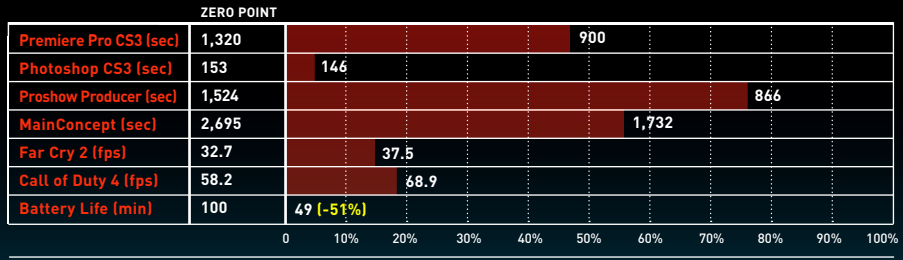
Is it worth a whopping $2,600? Not when there are less-expensive options that make fewer compromises.

ORIGIN EON15-3D
$2,613, www.originpc.com

VERDICT **7**

CPU	1.73GHz Intel Core i7-820QM
RAM	4GB DDR3/1333
Chipset	Intel PM55
GPU	Nvidia GeForce GTX 285M
Hard Drive	Seagate Momentus XT 500GB HDD (7,200rpm)/SSD hybrid
Optical	LG BD ROM/DVD burner
Connectivity	DL DVD-D, HDMI, Ethernet, modem, four USB 2.0, eSATA, media reader, webcam, Wi-Fi, Bluetooth, headphone, mic, line in, digital S/PDIF
Lap/Carry	9 lbs, 11.2 oz / 7 lbs, 12.7 oz

BENCHMARKS


ZERO POINT
Premiere Pro CS3 (sec) 1,320 900
Photoshop CS3 (sec) 153 146
Proshow Producer (sec) 1,524 866
MainConcept (sec) 2,695 1,732
Far Cry 2 (fps) 32.7 37.5
Call of Duty 4 (fps) 58.2 68.9
Battery Life (min) 100 49 (-51%)
0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero-point notebook is an iBuypower M865TU with a 3.06GHz Core 2 Duo T9900, 4GB DDR3/1066 RAM, a 500GB Seagate hard drive, a GeForce GTX 260M, and Windows Vista Home Premium 64-bit. Far Cry 2 tested at 1680x1050 with 4x AA; Call of Duty 4 tested at 1680x1050 with 4x AA and anisotropic filtering.

Toshiba Satellite A665-3DV

Covers almost all the bases

Toshiba's Satellite A665-3DV presents an interesting juxtaposition to Origin's machine—for one thing, it costs $1,000 less. Like Origin's EON15-3D, the A665-3DV features a 15.6-inch, 1366x768, 120Hz glossy screen, and uses Nvidia's 3D Vision kit.

This machine, like Origin's, also comes with a 1.73GHz Intel Core i7-740QM quad-core processor, which makes for strong performance in all of our content-creation benchmarks. The A665-3DV has a bigger hard drive than the Origin rig (640GB vs. 500GB), but it's slower (5,400rpm vs. 7,200rpm), which could account for the latter's lead in productivity apps. A more significant difference between the two machines, however, is the A665-3DV's use of a GeForce GTS 350M for graphics chores. While this is considered an enthusiast GPU, its scores in Far Cry 2 and Call of Duty 4 were 33 percent and 42 percent lower, respectively, than those of the Origin's GTX 258M. Indeed, at our standard gaming benchmark settings, using 4x AA and anisotropic filtering and running at 1680x1050 on an external display, the GTS 350M reached just barely playable frame rates.

Obviously, this didn't bode well for 3D game performance. We saw CoD 4 drop to 24.5fps at the notebook's 1366x768 native res. Yes, you can improve matters by lowering settings—in FC2, for example, we could reach 31.2fps at 1366x768 by turning all the quality settings to low. Lowering the resolution could also provide a boost. But we found ourselves questioning whether the enhanced realism and immersiveness that 3D promises isn't offset by diminishing all graphical details.

One thing the GTS 350M has going for it is the ability to play Blu-ray 3D movies. And a nice perk of Toshiba's A665-3DV is that it comes bundled with Corel WinDVD for Blu-ray 3D—none of the other notebooks here include a Blu-ray 3D player, meaning you have to shell out another hundy for the privilege. If watching 3D movies on a small laptop screen doesn't float your boat, an HDMI port lets you connect to a 120Hz 3D projector.

The A665-3DV is notable in a couple other respects.

The optical drive in the A665-3DV reads *and* writes Blu-ray discs.

It's the only rig in this roundup that offers BD burning as well as reading through its optical drive. And its 12-cell battery actually makes it viable to use away from a power outlet. Quad-core and discrete GPU notwithstanding, the laptop played a DVD in power-saving mode for more than two hours before losing juice. And still, the laptop had the second-lightest weight of the bunch.

Aesthetically, the A665-3DV is only slightly more ornate than the Origin EON15-3D—it's all-black finish is spruced up some with texture on the laptop's lid and around the keyboard, which itself is underlit by blue LEDs.

Were it not for the compromises inherent to playing 3D games on mobile-graphics power, we'd say the A665-3DV is a pretty good deal.

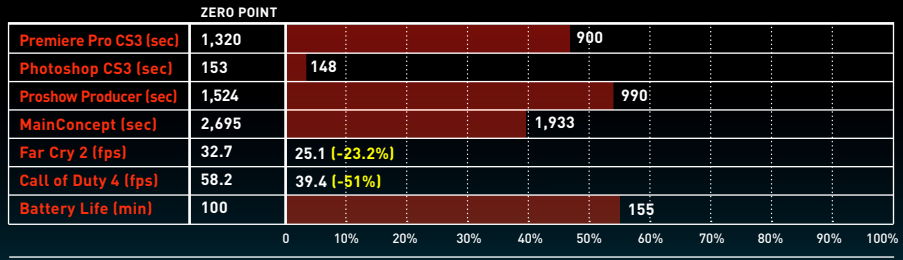
TOSHIBA SATELLITE A665-3DV
$1,600, www.toshiba.com

VERDICT **8**

SPECIFICATIONS

CPU	1.73GHz Intel Core i7-740QM
RAM	4GB DDR3/1066
Chipset	Intel HM55
GPU	Nvidia GeForce GTS 350M
Hard Drive	Toshiba 640GB HDD (5,400rpm)
Optical	Matshita BD/DVD burner
Connectivity	VGA, HDMI, Ethernet, three USB 2.0, one USB 2.0/eSATA, headphone, mic, ExpressCard/34, webcam, Wi-Fi, Bluetooth
Lap/Carry	8 lbs, 2.1 oz / 6 lbs, 11.7 oz

VISTA 64-BIT BENCHMARKS


ZERO POINT
Premiere Pro CS3 (sec) 1,320 900
Photoshop CS3 (sec) 153 148
Proshow Producer (sec) 1,524 990
MainConcept (sec) 2,695 1,933
Far Cry 2 (fps) 32.7 25.1 (-23.2%)
Call of Duty 4 (fps) 58.2 39.4 (-51%)
Battery Life (min) 100 155
0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero-point notebook is an iBuypower M865TU with a 3.06GHz Core 2 Duo T9900, 4GB DDR3/1066 RAM, a 500GB Seagate hard drive, a GeForce GTX 260M, and Windows Vista Home Premium 64-bit. Far Cry 2 tested at 1680x1050 with 4x AA; Call of Duty 4 tested at 1680x1050 with 4x AA and anisotropic filtering.

Asus G51Jx 3DE

Revisions to first attempt pay off

The G51Jx 3DE is Asus's second iteration of a 3D Vision–based laptop, following last year's G51J 3D. In that time, the company has taken the noteworthy step of building the necessary IR emitter glasses into the laptop itself. This means hing hanging off of your machine or needing to be packed up for transport. It also mitigates any worries about the position of the external emitter, which, when turned at the wrong angle, can cause the glasses to shut off or act wonky. It's a big improvement to the overall experience and we commend Asus for the move.

The 15.6-inch notebook is primarily black, but a two-toned blue cover with a "claw-mark" motif reveals a gamer bias. The inside is understated but attractive, with a backlit keyboard that can be turned on or off, a comfy soft-touch palm rest, and a full-size island keyboard and number pad.

With the G51Jx 3DE you don't need an external IR emitter for 3D because it's built into the laptop.

e G51Jx 3DE features tel Core i7-720QM, ghtly slower than the a rigs, but the G51Jx 3DE still posted respectable numbers in the productivity benchmarks. And while Asus wisely chose a GPU that can play Blu-ray 3D movies, it went with the highest-end mobile part in that category, the GTS 360M. This on the GTS 350M in Toshiba's machine J, memory, and shader clocks, resulting mprovement in gaming. In fact, the GTS ed even the GTX 285M in Far Cry 2 by 20 per- hough it lagged behind Origin's card in Call of , with a score of 51.6fps. Still, the 360M provides ast a little more wiggle room when it comes to ancing performance and visual effects when 3D is enabled—while also supporting BD 3D.

The G51Jx 3DE comes bundled with CyberLink PowerDVD 9 for Blu-ray playback, but no software to support Blu-ray 3D. We tried using the latest release of CyberLink PowerDVD 10 Mark II to play a 3D movie, but we would barely get past the menu before a blank, flickering screen took over. CyberLink said this was due to a conflict with the latest graphics drivers which would be fixed with an upcoming patch. To us, it was just another reminder of the hassles that sadly accompany new technology. Fortunately, a prerelease build of WinDVD 3D did the job, treating us to the 3D version of *Monsters vs. Aliens* on the laptop's screen as well as through our 120Hz projector using the laptop's HDMI.

There's room for improvement here, but the G51Jx 3DE streamlines the 3D Vision experience and offers the best combination of 3D gaming and movie playback of all the notebooks here.

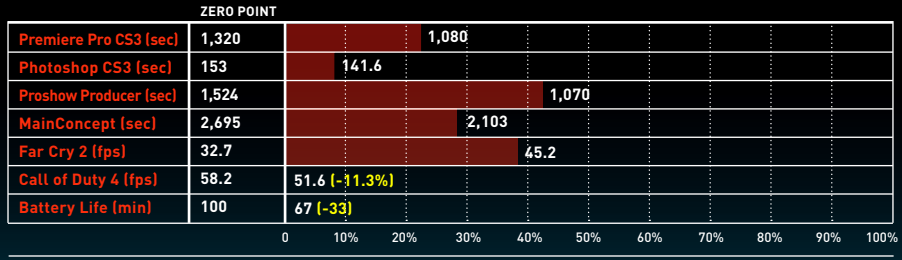
ASUS G51JX 3DE
$1,750, www.asus.com

VERDICT **9**

CIFICATIONS

CPU	1.60GHz Intel Core i7-720QM
RAM	6GB DDR3/1066 dual
Chipset	Intel HM55
GPU	Nvidia GeForce GTS 360M
Hard Drive	Seagate 500GB HDD (7,200rpm)
Optical	LG BD ROM/ DVD burner
Connectivity	VGA, HDMI, four USB 2.0, eSATA, FireWire, Ethernet, mic, headphone, 8-in-1 media reader
Lap/Carry	9 lbs, 3.4 oz / 7 lbs, 11 oz

VISTA 64-BIT BENCHMARKS


ZERO POINT
Premiere Pro CS3 (sec) 1,320 1,080
Photoshop CS3 (sec) 153 141.6
Proshow Producer (sec) 1,524 1,070
MainConcept (sec) 2,695 2,103
Far Cry 2 (fps) 32.7 45.2
Call of Duty 4 (fps) 58.2 51.6 (-11.3%)
Battery Life (min) 100 67 (-33)
0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero-point notebook is an iBuypower M865TU with a 3.06GHz Core 2 Duo T9900, 4GB DDR3/1066 RAM, a 500GB Seagate hard drive, a GeForce GTX 260M, and Windows Vista Home Premium 64-bit. Far Cry 2 tested at 1680x1050 with 4x AA; Call of Duty 4 tested at 1680x1050 with 4x AA and anisotropic filtering.

Lenovo IdeaPad Y560d

A passive alternative to 3D Vision

Lenovo breaks from the pack with its IdeaPad Y560d, eschewing Nvidia's 3D Vision kit in favor of a passive 3D solution. The Y560d's 15.6-inch, 1366x768 screen is polarized and capable of displaying two different perspectives of an image, which become a single 3D image when viewed through a pair of polarized glasses. The laptop comes with a fairly robust pair as well as a set of clip-on lenses to wear over prescription specs.

The hardware works in conjunction with TriDef 3D software. A single setup screen presents you with a stereoscopic image. With the glasses on, follow the prompts for adjusting the angle of the screen and your orientation to it—when done right, the image appears 3D. The effect is every bit as vivid as the one you get from a 3D Vision–based system, and the polarized glasses are more comfortable than the bulky powered shutter glasses and never need to be charged. The trouble is, there are serious trade-offs.

For one thing, you have to remain fairly fixed in that 3D-viewing sweet spot. If you move your head or the angle of the screen just so, the image loses focus. Another drawback is that neither the hardware nor software supports Blu-ray 3D playback. In fact, the IdeaPad Y560d doesn't even come with a BD-ROM drive. You can watch 3D movies using TriDef, but you're limited to videos in an open format, such as .avi, .mpg, and .mov. Lenovo includes some sample clips and trailers, and they certainly look impressive—but that's hardly a substitute for Blu-ray 3D blockbusters. As a consolation, TriDef will convert your standard-def DVDs to a 3D format, but that's a pretty weak substitute itself.

Game options are more plentiful. The TriDef app will automatically identify any games on your system that are 3D-capable—most modern games apply. By launching the game from within the TriDef app, the content is rendered in stereoscopy for 3D enjoyment with your polarized glasses. The same caveats about performance stand. While the Y560d's method for 3D is passive, it still requires twice the number of screens as 2D content and therefore presents a performance drag. Call of Duty 4 dropped from 37.1fps on a 1680x1050 external screen to 21.3fps on the Y560d's 1366x768 screen when 3D was enabled.

The Y560d is the flashiest of the bunch, with a large tribal design on its lid and orange trim around the screen.

Aside from its 3D implementation, the Y560d is similarly configured to the other laptops here, sporting a quad-core processor, a 500GB, 7,200rpm hard drive, and 4GB of DDR3/1333 RAM. Its Radeon HD 5730 videocard is a mixed bag, doing slightly better than our zero-point in FC2 (without 3D, natch), but significantly worse in Call of Duty 4.

This isn't the laptop to buy if you're looking for a full-fledged 3D experience, which to us means 3D Blu-ray movies and the ability to watch them on a large external screen, not to mention an experience that doesn't limit you to a narrow viewing angle. But the Y560d is priced right if you want a well-rounded 15.6-inch laptop that offers a (relatively) inexpensive way to tinker with the occasional 3D game.

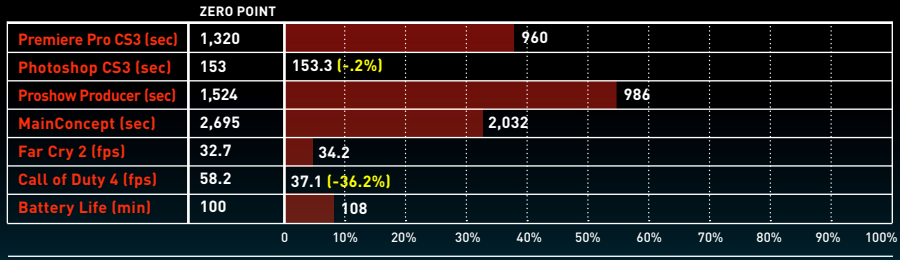
LENOVO IDEAPAD Y560D
$1,400, www.lenovo.com

VERDICT **6**

SPECIFICATIONS

CPU	1.60GHz Intel Core i7-720QM
RAM	4GB DDR3/1333 dual-channel
Chipset	Intel HM55
GPU	ATI Mobility Radeon HD 5730
Hard Drive	Hitachi 500GB 7,200rpm HDD
Optical	Slimtype DVD burner
Connectivity	VGA, HDMI, three USB 2.0, one USB 2.0/eSATA, Ethernet, headphone, mic, webcam, Wi-Fi, Bluetooth
Lap/Carry	7 lbs, 9.6 oz / 6 lbs, 2.6 oz

VISTA 64-BIT BENCHMARKS


ZERO POINT
Premiere Pro CS3 (sec) 1,320 960
Photoshop CS3 (sec) 153 153.3 (-.2%)
Proshow Producer (sec) 1,524 986
MainConcept (sec) 2,695 2,032
Far Cry 2 (fps) 32.7 34.2
Call of Duty 4 (fps) 58.2 37.1 (-36.2%)
Battery Life (min) 100 108
0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero-point notebook is an iBuypower M865TU with a 3.06GHz Core 2 Duo T9900, 4GB DDR3/1066 RAM, a 500GB Seagate hard drive, a GeForce GTX 260M, and Windows Vista Home Premium 64-bit. Far Cry 2 tested at 1680x1050 with 4x AA; Call of Duty 4 tested at 1680x1050 with 4x AA and anisotropic filtering.

Asus VG236H

Everything you need for 3D

The Asus VG236H is one of two panels we tested that utilize Nvidia's 3D Vision technology, but the only one that comes with Nvidia's 3D Vision kit (active 3D shutter glasses, IR emitter, and drivers), which is a nice inclusion as the kit itself runs about $180. The 23-inch monitor runs in standard 1920x1080 widescreen at 120Hz and has dual-link DVI, HDMI, and component inputs. While the monitor will move up and down for height adjustment, and tilt forward and back, it does not swivel from left to right.

The VG236H's glossy screen features something Asus calls "Color Shine Technology," which certainly makes colors pop, but the "Anti-reflection Glare Panel" could use some work—like most glossy screens, this one revealed plenty of reflection. Likewise, we thought the onscreen menu navigation could use some improvement; it was hard to find a way to exit out of options and the menu visibility was occasionally so light it was difficult to read (during movie viewing). While the monitor scored well in our DisplayMate (www.displaymate.com) tests, it did reveal some detail loss in the black-level test—an issue we saw recreated in some of the predominantly dark scenes in *V for Vendetta*—as well as some issues in the internal reflections test, showing halos around the white boxes. Overall, however, the monitor performed admirably and rendered 3D flawlessly during our game tests.

Colors pop nicely on the VG236H, but the glossy screen also produces plenty of reflections.

SPECIFICATIONS

Viewable Area	23 inches
Native Resolution	1920x1080
Panel Type	TN
Inputs	DVI, HDMI, Component

ASUS VG236H
$500, www.asus.com

VERDICT **8**

Alienware OptX AW2310t

An opaque contender

The OptX AW2310t was the only matte screen we tested, and it earns points for its ability to swivel, tilt, and turn.

ALIENWARE OPTX AW2310T VG236H
$430, www.dell.com

VERDICT **8**

Alienware's OptX AW2310t also uses Nvidia's active 3D Vision kit—however, it has to be purchased separately. Much like Asus's monitor, the OptX AW2310t is a 23-inch widescreen, 1920x1080, TN monitor. It includes HDMI and DVI ports. It also features four USB ports (which are a lot more accessible if you don't use the included cable cover), and you can adjust the screen's height, swivel, and tilt to suit your preference. It also differentiates itself from the Asus by having a matte screen—which doesn't produce colors quite as vividly as the Asus but it also doesn't produce any distracting reflections.

The AW2310t's menu buttons are neatly located on the side bezel and easy to navigate. We like that there is an option to personalize shortcut buttons. The monitor performed consistently through our DisplayMate tests—beating out the Asus in the internal reflections test and holding its own in the color and intensity tests. It also did well with text, down to 6.8 points, although it did occasionally appear a bit grainy in grayscales. While playing Batman: Arkham Asylum in 3D, we noticed some ghosting around background objects, but didn't see any other signs of strain. If you're looking for a well-designed 3D monitor—with an anti-glare screen—this one should serve you well. That is, as long as you have the extra cash for the 3D Vision kit.

SPECIFICATIONS

Viewable Area	23 inches
Native Resolution	1920x1080
Panel Type	TN
Inputs	DVI, HDMI, four USB ports

Zalman ZM-M240W

A monitor only a masochist could love

The 24-inch Zalman ZM-M240W distinguishes itself right out of the gate by using passive 3D technology on a 60Hz monitor. Zalman uses iZ3D Stereoscopic drivers to power the TN panel, and includes a set of rather flimsy glasses as well as an additional clip-on set for users who wear corrective glasses. The monitor itself will tilt but does not turn from left to right or adjust for height. But that was the least of our concerns.

From the start, setup issues plagued us—we had difficulty with the iZ3D software, which was confusing to navigate and thoroughly unhelpful, as well as the Zalman Stereoscopic player, which doesn't work with Blu-ray 3D movies. Yes, that's right: This $650 (with software) monitor does not play Blu-ray 3D movies. Zalman says it's looking into enabling it to do so, but has primarily designed the monitor for 3D gaming.

Unfortunately, its performance during our gaming tests was poor. Bright whites bled out all details, and despite Zalman's reported 5ms response time, we saw plenty of ghosting and double images. This was partially because changing the viewing angle even slightly resulted in a loss of 3D effect. DisplayMate tests and regular DVD viewing revealed light leakage along the top and bottom of the monitor, jagged lines in close-up photos, trouble with grayscales and black-and-white saturation tests, and difficulty with color registration. The glossy screen blundered through the internal reflections test and displayed a curious white line framing the display. Zalman's included 3D clips were nearly unwatchable due to stuttering and freezing. Overall, a disappointing and frustrating experience.

A problem child from start to finish, the ZM-M240W was the only monitor we tested that featured passive 3D technology.

SPECIFICATIONS

Viewable Area	23 inches
Native Resolution	1920x1080
Panel Type	TN
Inputs	DVI, VGA

VERDICT

ZALMAN ZM-M240W

$650(with software), $600 (without), www.zalman.co.kr

3

3D TIMES THREE

How to Run 3D across Three Monitors

Nvidia's 3D Vision kit will support a triple-monitor setup, provided all three monitors are 120Hz panels of the same make and model and you are running a GeForce GTX 460 or higher in two-way SLI or a GTX 260 in three-way SLI. Here's how you set it up.

First, head over to the Nvidia Control Panel and select Configure SLI, PhysX, Surround. In the newly opened tab, click Span Displays w/Surround and hit Configure. Every distinct three-panel setup requires a different set of GPU plugin configurations. In our setup, we were running three GTX 480s in SLI, but your plugin configurations will depend on your GPUs (and remember, in order to do this, you've got to have at least two GPUs running in SLI).

Once you've selected your plugin configurations, we recommend restarting your computer (when we didn't, our computer had difficulty picking up on all three monitors). Once the Nvidia Control Panel identifies all three panels, you're ready to continue.

Next, you'll be asked to arrange your displays, which is easy enough. Hit the identify button to see numbers displayed across all three of your panels, then drag the numbered icons to match the numbers on your display.

The next screen will give you the option to adjust for the monitors's bezels. This is a relatively simple task that we actually found quite helpful. The bezel correction image is a picture of a road that stretches between two monitors. You'll notice that the road is fragmented between each panel, so simply raise or lower your surround panels until the road appears straight.

Once your three monitors have been configured, load up your favorite game, crank the resolution up to 5760x1080, and you're ready to bask in the glory of three-panel 3D gaming.

Troubleshooting Checklist

OK, maybe you're not really good to go, after all. Have no worries—we've distilled a quick drill for a system that will not POST.

✔ Is the power supply switch turned on?

✔ **Is the power supply plugged in firmly?**

✔ Is the power cable plugged into the wall?

✔ Is the monitor on?

✔ Is it plugged into the PC? (Hey, we have to ask.)

✔ Is the front-panel connector for the power switch wired correctly?

✔ Did you plug in the ATX12V/EPS12V? Failing to plug this in will prevent the system from POSTing.

✔ **Disconnect any 4-pin Molex connectors. These are easy to accidentally short out.**

✔ Do you have the RAM in the correct slots? RAM in the inner pair of slots in a Core *ix* rig may cause it not to POST. Remember to power down the PSU before you move RAM around.

✔ **Reseat RAM (with power off).**

✔ Reseat GPU (with power off).

✔ **Reseat the CPU (with power off).**

✔ Remove and reseat the motherboard and check for errant standoffs on the tray that may be shorting the system.

DEPT. OF WHAT NOW?

The Best Way to Install Windows

So you pulled off the task of building your new PC and it POSTed on the first attempt. Now what? Believe it or not, there's actually a method to installing Windows and the associated service packs, patches, and drivers. Even with Windows 7. Here's how we do it in the Maximum PC Lab.

First, perform a standard installation of Windows. If you've never done this, simply put the install disc in the optical drive and the machine should boot to it.

After you've installed Windows, next install all the service packs and patches. Since most people don't have the patches downloaded, you will need to connect your machine to the Internet to download them. Windows 7 supports most network devices with native drivers, so you should be able to easily accomplish this task.

One thing to note: Make sure your box is hooked up behind a NAT—you do not want to hook an unpatched machine directly to the Internet because it will come under attack almost immediately. Also, do not do anything with the machine other than run Windows Update. Remember, the machine will have built-in vulnerabilities out of the box. Many people begin surfing around while downloading patches in the background. This is just patently not safe without proper antivirus protection and the latest security patches installed.

Once you have the latest patches or service packs installed, you should install the drivers for your board, load an antivirus application, and continue with your configuration and setup.

Finally, remember how we told you not to hook up the data cable of the secondary SATA drive? Now would be a good time to do this. Why did we recommend waiting in the first place? We've seen the Windows boot loader get quite wonky when it sees multiple drives to install the OS to. One time, on a two-drive machine, we watched Vista install the system volume on one drive and the OS on the other. This would mean that one day, if you removed the secondary drive, the machine would stop booting.

Toshiba Satellite A665-3DV

Covers almost all the bases

Toshiba's Satellite A665-3DV presents an interesting juxtaposition to Origin's machine—for one thing, it costs $1,000 less. Like Origin's EON15-3D, the A665-3DV features a 15.6-inch, 1366x768, 120Hz glossy screen, and uses Nvidia's 3D Vision kit.

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Obviously, this didn't bode well for 3D game performance. We saw CoD 4 drop to 24.5fps at the notebook's 1366x768 native res. Yes, you can improve matters by lowering settings—in FC2, for example, we could reach 31.2fps at 1366x768 by turning all the quality settings to low. Lowering the resolution could also provide a boost. But we found ourselves questioning whether the enhanced realism and immersiveness that 3D promises isn't offset by diminishing all graphical details.

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It's the only rig in this roundup that offers BD burning as well as reading through its optical drive. And its 12-cell battery actually makes it viable to use away from a power outlet. Quad-core and discrete GPU notwithstanding, the laptop played a DVD in power-saving mode for more than two hours before losing juice. And still, the laptop had the second-lightest weight of the bunch.

Aesthetically, the A665-3DV is only slightly more ornate than the Origin EON15-3D—it's all-black finish is spruced up some with texture on the laptop's lid and around the keyboard, which itself is underlit by blue LEDs.

Were it not for the compromises inherent to playing 3D games on mobile-graphics power, we'd say the A665-3DV is a pretty good deal.

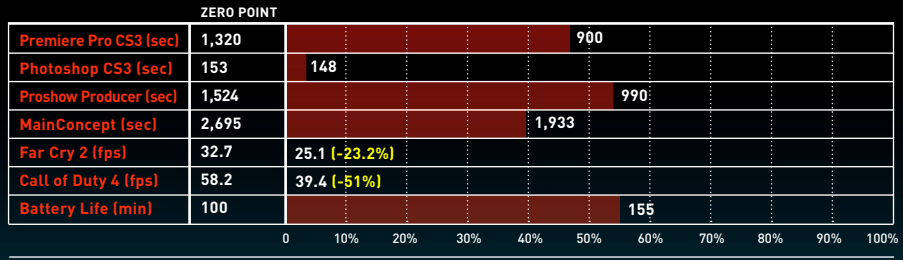
TOSHIBA SATELLITE A665-3DV
$1,600, www.toshiba.com

VERDICT **8**

SPECIFICATIONS

CPU	1.73GHz Intel Core i7-740QM
RAM	4GB DDR3/1066
Chipset	Intel HM55
GPU	Nvidia GeForce GTS 350M
Hard Drive	Toshiba 640GB HDD (5,400rpm)
Optical	Matshita BD/DVD burner
Connectivity	VGA, HDMI, Ethernet, three USB 2.0, one USB 2.0/eSATA, headphone, mic, ExpressCard/34, webcam, Wi-Fi, Bluetooth
Lap/Carry	8 lbs, 2.1 oz / 6 lbs, 11.7 oz

VISTA 64-BIT BENCHMARKS


ZERO POINT
Premiere Pro CS3 (sec) 1,320 900
Photoshop CS3 (sec) 153 148
Proshow Producer (sec) 1,524 990
MainConcept (sec) 2,695 1,933
Far Cry 2 (fps) 32.7 25.1 (-23.2%)
Call of Duty 4 (fps) 58.2 39.4 (-51%)
Battery Life (min) 100 155
0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

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INTRODUCING MAXIMUM TECH

Created by the *Maximum PC* editors, our new quarterly magazine, *Maximum Tech*, covers the bigger, wider world of personal technology. Basically, if it's high-tech, super cool, and intended for hands-on human operation, we will cover it—with passion. Previewed on the next three pages, this first issue of *Maximum Tech* will be sold exclusively on newsstands beginning the first week of September.

MAXIMUM PC PRESENTS
MAXIMUM TECH
THE COOLEST NEW GEAR, REVIEWED & EXPLAINED
OCT/NOV 2010
PREMIER ISSUE!
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TAKE [illegible] INSIDE!

Also in the issue:
four high-tech watches,
field-tested and reviewed.

Android Tablet Takeover

The Dell Streak leads a pack of some 38 potential iPad assassins. Can a 5-inch phablet send Apple running?

It may not be a great tablet, but the Streak succeeds as a navigation device.

Gadget manufacturers have an Apple problem. As of this July, the bean counters in Apple HQ were reporting 3.27 million iPads sold. That's a whole lotta tablets, suggesting the time is right for an HP, Toshiba, or Samsung to release a competitor. And, indeed, the Internets are a'twitter with tough talk about new touch-screen devices on the horizon, most loaded with Google's Android OS. But while some 38 different iPad killers were churning through the rumor mill as of this writing, no big-name PC company has yet released a tablet—except Dell.

Reviewed to within inches of its life in *Maximum Tech*, the Android-based Streak has a lot of great features. However, with its puny 5-inch screen, it's much more of a humongoid-large smartphone than a legitimate iPad challenger. But let's start with the good news. We applaud—*vigorously*—the ability to drag-and-drop music files to and from the Streak. In a world where restrictive, vexing iTunes operation drives people into mental institutions, the Android way flat-out rules. You also get complete multitasking support (still missing from the iPad) and two cameras, front and rear (the iPad has none). But the Streak's most killer feature is its functionality as a no-excuses GPS navigation device, complete with voice instructions and a familiar "follow this arrow down this street" mapping interface.

Unfortunately, the Streak's screen size, while perfect for a sat-nav device, isn't so great for web-surfing, emailing, casual gaming, movie-watching, and all the other activities we love to do on the iPad. Dell should have ditched all smartphone pretensions and given the Streak a 7-inch screen. The Streak should also be shipping with the latest version of Android, not the 1.6 version with which it's currently hobbled.

The Streak may be the first Android-based competitor, but it's not the last. Read our full survey of the tablet scene in *Maximum Tech*. —JON PHILLIPS

The Most Dangerous Laser Ever?

Why Wicked Lasers' Arctic is so damn fascinating—and terrifying

Until just recently, 1-watt blue lasers weren't anything one would describe as "personal technology." They cost thousands of dollars, and came in unwieldy casings that sat on tabletops. The new Arctic from Wicked Lasers doesn't just challenge these conventions. It taunts and ridicules them. And we had the pleasure—and dread responsibility—of testing two Arctic specimens for *Maximum Tech*.

While the Arctic is designed to be held in your hand, it's not a "laser pointer" and certainly not a toy. Laser pointers are typically powered between 1mW and 5mW. The Arctic is spec'd at a minimum of 800mW and as much as a full watt, making it a Class IV laser device that can burn skin and start fires. A laser this strong can also cause irreversible blindness if one looks directly into it, or at the reflected dot it creates when shined on objects. What's more, its power levels aside, the Arctic's blue laser light poses health hazards unique to its 445nm wavelength: Exposure can cause photochemical-induced retinal injuries that can reduce a person's ability to see the color green. But, of course, if the laser has blinded you, the "not seeing green" issue is moot.

We used safety goggles for all indoor testing, but pulled them off when shining the laser into the nighttime sky. With nothing to "bounce off of," the beam couldn't cause a dangerous reflection. We were also careful not to shine the beam at aircraft, for that would be not only dangerous and the prank of a Class IV A-hole, but also illegal. The Arctic itself isn't illegal to own or even use in a lawful manner, but it has been put on "import alert" by the FDA, the federal agency that regulates lasers.

Plummeting laser-diode prices make it possible to sell the Arctic for the gadgety price of $300, but just because a device *can* be produced, *should* it be produced? We cover the Arctic from every angle in our six-page *Maximum Tech* report.

—JON PHILLIPS

Watch where you point that thing, Patrick.

Also in the issue: Learn how to properly test an HDTV.

Google TV: Seven Burning Questions Answered

Intel, Logitech, Sony, and Google merge TV and Internet like never before

Google TV aims to meld the hundreds of channels available on pay television with the virtually unlimited content—video and otherwise—available on the Internet. But what exactly is it? We've squeezed our sources at Google, Intel, and Logitech for answers.

IN CONCRETE TERMS, WHAT THE HECK IS GOOGLE TV?

Google TV promises to be an electronic program guide on steroids. It's a menu interface that exposes not only what's being broadcast on TV, but also what's available on YouTube, Netflix, Hulu, and even on your DVR or personal media server. It could be the perfect alternative to watching TV with a notebook or tablet balanced on your lap.

WHO'S INVOLVED?

Google is providing the underlying OS (Android) and browser (Chrome). Intel is providing its Atom CE4100 system-on-chip. Logitech will offer a set-top box called the Revue, and Sony is incorporating Google TV into new HDTVs and Blu-ray players.

HOW DOES GOOGLE TV RELATE TO INTEL'S SMART TV?

"Smart TV isn't a product," says Intel Consumer Experience Architect Brian David Johnson. "It's more of a type of TV experience. But no idea happens in isolation, says Johnson. "Google had an understanding early on that it wanted a way to tie TV into Internet search. We had the platform."

Google TV will use picture-in-picture technology to display your search results on top of live TV.

WHAT ARE THE HARDWARE REQUIREMENTS?

Unless you're a Dish Network subscriber, you'll need a Google TV device or a TV with integrated Google TV.

HOW MUCH WILL GOOGLE TV COST?

Logitech and Sony have been exceedingly tight-lipped when it comes to discussing pricing, but Google TV software will be free.

WHAT CAN WE EXPECT FROM THE LOGITECH REVUE HARDWARE?

The box will incorporate Logitech's Harmony Link engine and Unify technology (for remote pairing). The universal remote has a touchpad and will control the other gear in your entertainment center).

For the full story on Google TV, pick up the premiere edition of *Maximum Tech*, on newsstands now. —MICHAEL BROWN

Logitech's Revue is equipped with an HDMI input, so that it can overlay Google TV on top of whatever video you're watching.

Also in the issue:
37 reviews of high-tech gear and gadgets.

WHITE PAPER

Advanced Encryption Standard

How AES secures your data

–ZACK STERN

Any 10-year-old knows how to protect information: Use a secret code. Disk encryption follows a similar process, bending and pulling information into a jumble that appears random. Reverse the steps and the bytes become readable again, restoring your Word doc, JPEG, or any other data into readable form. We'll explore how disk encryption works and how AES secures your data.

While there is no clear "best" method of encryption, AES (Advanced Encryption Standard) is one of the most prominent. AES is free for any public or private use, including commercial applications. The encryption standard has also held up to great scrutiny, winning an open U.S. government competition to replace DES (Data Encryption Standard). AES originated as the Rijndael method, named after its designers, Vincent Rijme and Joan Daemen. The federal government trusts it so much that its various agencies use it to secure information classified as Top Secret.

AES USES A NETWORK OF SUBSTITUTION AND PERMUTATION BOXES

Since it's good enough for the supersecretive National Security Administration—and it's free!—you'll find AES within most encryption systems, including the BitLocker and FileVault tools built into Windows 7 and OS X, respectively. You'll also find it deployed within SSL websites, Wi-Fi networks (WPA2), and other applications. AES keeps your data safe because its details are widely known and tested. Here's how it works.

AES ABC

Each data encryption step can seem simple on its own, and AES shares many of the same fundamental building blocks, called cryptographic primitives, as other methods. But the specific combinations and AES constants render it unique.

AES first runs its key-expansion step, turning your password into a series of keys. AES uses a symmetric key: Your original password encrypts and decrypts the data. The process is also known as secret key, single key, shared key, and private key. Asymmetric-key encryption, by comparison, relies on different passwords to encrypt and decrypt.

The key-expansion process rotates your input data—simply shifting and transposing it linearly—and then exponentially expands everything through several layers of math. Your AES keys can be 128-, 192-, or 256-bits long—as the size increases, so does the complexity, rendering it harder for hackers to guess their way into your data.

AES, like most encryption schemes, uses a network of substitution and permutation boxes to scramble data in a controlled way. A substitution box translates one point of data into another, such as a basic alphanumeric encryption scheme that turns "A" into "1," "B" into "2," and so on. The permutation box shifts that result: "1" could become "2" and "2" could become "3."

AES uses more complicated, repeating sets of S- and P-box rules so that a small change in any input will greatly change results as the process continues. Its mathematically generated lookup-table and substitution rules are designed to create this ordered chaos. Yet since the rules are public, critics can see that AES designers didn't plant backdoor access in the process.

ROUND AND ROUND

Each encryption repetition is called a round. But before the first round occurs, AES applies the AddRoundKey process, merging the first-round key—generated from your password—with bytes of plaintext (unencrypted) data. The parts combine with the "exclusive or" operation (XOR), generating a value of "true" if exactly one of the inputs is true. Those results are passed along.

A full AES round has four steps, beginning with the SubBytes process. This looks up the first and second characters of a byte (in hex) on AES's substitution box matrix, revealing a new byte from the intersection of the row and column.

HOW IT WORKS

A Symmetric Block Cipher

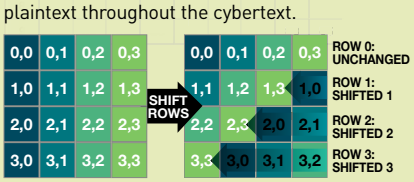
Step 1: SubByte Scrambling

A substitution box (S-Box) replaces one byte for another based on an algorithm.

The S-Box converts the hexadecimal value of byte 0x41 to fa.

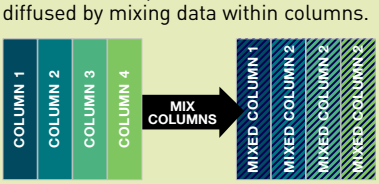
Step 2: Row Shifting

Shifting each row disperses patterns in the plaintext throughout the cybertext.



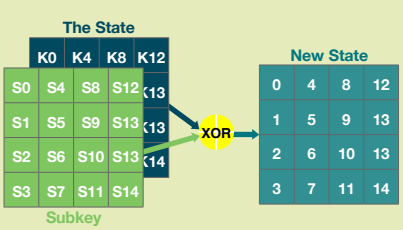
Step 3: Column Mixing

Patterns in the plaintext are further diffused by mixing data within columns.



Step 4: AddRoundKey

Encryption occurs here, when each byte in the State is XORed with the Subkey.



Imagine writing those results on a piece of paper wrapped around a cylinder. If you twist the paper and cut it free at a new place, you'll get a new starting and ending point. The ShiftRows process does this, offsetting a string of four bytes up to three places. For example, "7e, ab, 09, 8d" becomes "ab, 09, 8d, 7e" when shifted one place.

The third step, MixColumns, changes groups of four bytes as columns, multiplying them in certain ways based on a fixed matrix. Each byte gets multiplied four times; each iteration leaves it unchanged, shifts it left, or shifts it left and combines XOR with the prior value.

AddRoundKey makes the final step, combining the output bytes with a new round key through the XOR operation. The resulting data gets fed back into a new round.

AES repeats these steps a certain number of times depending on the bit-level of the key. 128-bit keys generate 10 rounds, 192-bit keys last for 12 rounds, and 256-bit keys extend to 14 rounds. Since bigger keys involve more number crunching, higher bit rates take longer to encrypt and to decrypt.

When the time comes to reveal your original data, the ciphertext is decrypted back into plaintext by running these steps in reverse.

BOOT IT

AES—any encryption scheme, really—works to protect specific files and folders, but things get more complicated if you want to encrypt an entire disk. Specifically, if the OS is encrypted, how can you input a password and begin the decryption process?

In that case, you'll either need a disk or other hardware that can decrypt before you boot, or your tools will begin decryption within the BIOS or boot firmware.

Specific implementations of AES can be flawed, letting an attacker intercept a password, for example. The core method, however, shows little vulnerability to attack, giving it staying power as one of the most prominent encryption methods.

Livescribe Echo

Livescribe's Echo smartpen takes time-stamped photos of your handwriting (it works with drawing too) as you write on its special microdot paper, it can simultaneously record up to 800 hours audio—a boon to students, journalists, and anyone else who takes copious amounts of notes. Tap any word you've written illustration you've drawn and you'll hear the audio that was recorded the instant you were scribbling. We took apart the 8GB model to see what it takes to pull off this trick.

ARM9 PROCESSOR This 32-bit CPU powers Livescribe software and d its user inter

MICRO USB CONNECTOR Connect the Echo to your PC with a USB cable to archive your notes and recordings.

CAMERA ...o's infrared ...ra takes digital ...apshots of both your ...scribbling and the nearly invisible pattern of microdots printed on the special Livescribe paper (the camera's sensors can see these microdots even through the pen's ink). The pen uses the dot pattern to track its ... ment over the pa... stores your pe... as digital in...

...AKER This tiny ...peaker won't rock ...he house, but it will play back audio you've recorded as well as translations of simple words. It can also produce musical instrument sounds, such as a piano, bas... on the musical n... you've written

...ASH MEMORY (Under processor) This model stores your digitized notes and audio recordings in 8GB of NAND flash memory (a less-expensive model is available with 4GB of storage).

3.5MM AUDIO JACK Plug in a set of he... ...nones or earbuds for private listening, or pick up Livescribe's optional Echo 3D Premium Recording Headset to produce stereo recordings.

OLED DISPLAY (On other side The Echo's user interface, ... simple language translations, other information are displayed this 96x18-pixel OLED.

SUBMIT YOUR IDEA Ever wonder what the inside of a power supply looks like? Don't take a chance on destroying your own rig; instead, let us do the dirty work. Tell us what we should crack open for a future autopsy by writing to comments@maximumpc.com.

HOW TO

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RESCUE OFF-SCREEN WINDOWS

ALEX CASTLE
ONLINE MANAGING EDITOR

If you use more than one display, you've probably experienced Lost Window Syndrome—when one of your windows is inaccessible because it's on the desktop of a powered-off or disconnected display. Fortunately, there are two easy cures for LWS:

1) Right-click the window in the taskbar and select Move, then press one of the arrow keys. The window is now locked to your mouse, so you can bring it back into view before clicking again to drop it.

2) Select the window with Alt + Tab, then hold the Windows key and press the right or left arrow key. A single press will snap the window to the side of the screen, two presses will move it to the next screen (if there's another display in that direction).

SUBMIT YOUR IDEA Have a great idea for a How To project? Tell us about it by writing to comments@maximumpc.com.

WINDOWS TIP OF THE MONTH

Undo a File Move

Everyone knows that Control + Z is the hotkey for "undo" in programs like Word and Outlook, but did you know that it works in Windows Explorer as well? The hotkey lets you undo file moves, copies, and deletions (as long as you don't permanently delete the file with Shift + Delete).

Control Your Mouse with a Gamepad Using Xpadder

A desktop is more than just a computer. It can also be a full entertainment center, capable of providing you with endless hours of gaming, movies, and music. Over time, it's become much more common to see PCs synched to TVs as people are beginning to see the advantages of having easy, living-room-wide entertainment powered by their computers.

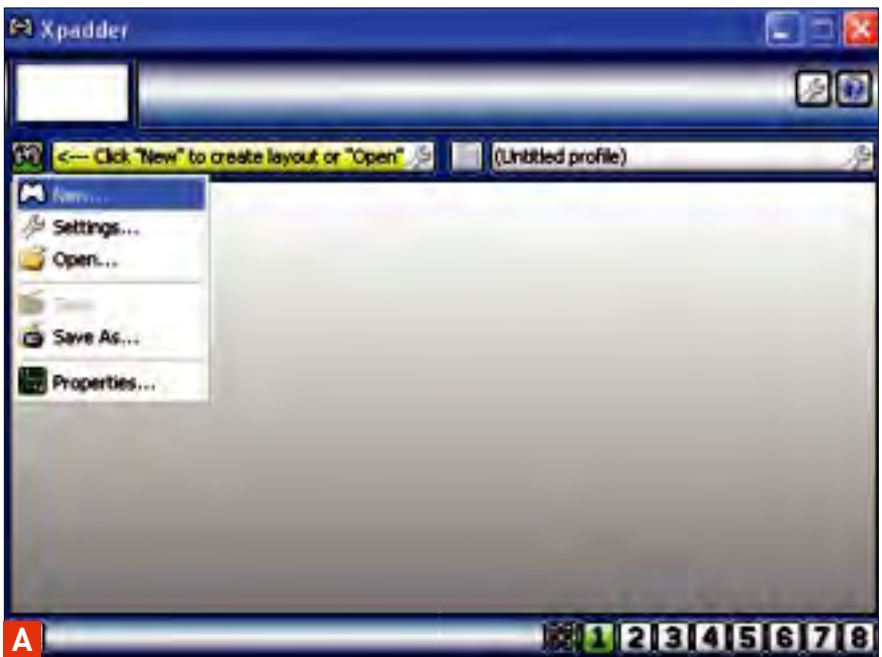
The downside to using your PC from the couch lies strictly in loss of control. A wireless keyboard and mouse combo will work for basic computing tasks, but can be hard to manage and feel laggy—a problem for tasks like watching movies (where a mouse and keyboard are cumbersome) and gaming (where you need split-second response). Wired keyboards and mice are an option, although they frequently aren't designed with a cable long enough to be used from across the room.

There is, however, a simple alternative. Do you have a wired USB console controller tucked away somewhere, gathering dust? Using the open-source program Xpadder, you can configure that very controller to become a versatile tool for your day-to-day long-distance computing needs. –ALAN FACKLER

1 LET'S GET STARTED

Pretty much any gamepad will work (provided you can hook it up to your computer) but if you're looking for the best experience available right now, we recommend going with the wired model of the Xbox 360 controller. With tons of buttons, a luxuriously long USB cable, and solid build quality, it's far superior to any of the cheapo PC-only gamepads on the market right now. If you're feeling adventurous, you can also find third-party drivers that will allow a Bluetooth-enabled PC to work with a wireless PS3 controller.

The newest version of Xpadder is available for $10 at www.xpadder.com. If you want to try the software first, the most recent free version of the software is still available legally at http://bit.ly/v2xVF. Note, however, that if you get the older version of the software, you'll have to run it in compatibility mode in Windows 7. Installation is quick and painless. Open Xpadder and click the controller icon on the top-left of the program, and hit New (image A).



A

This will open a tabbed interface that you'll use to configure your controller. Before you begin the actual configuration, you'll need an image of the controller you'd like to use. You will use the picture to assign different functions to the controller (image B).

Finding an image isn't hard—we found a great bitmap with a simple image search. You can also consult the forums on the Xpadder homepage. Save the image to a folder then click Open in Xpadder to find it.

2 CONFIGURE YOUR GAMEPAD

Once the controller is on the screen, you're ready to begin. You'll notice different tabs that correspond to different parts of your controller. The Sticks tab, for example, corresponds to your joysticks.

B

C

E

Every time you calibrate a part of your controller, you've got to drag that operation (in the form of circles for joysticks and squares for buttons) over the part of the controller you'd like to change (image C). The Buttons tab should handle the majority of the controller. Note that the joysticks can also be programmed as buttons in this tab (how else are you supposed to knife somebody in Call of Duty?).

Once you've calibrated all of your buttons, you're ready to assign commands. This is where Xpadder really shines as a program—commands are totally different depending on what program or game you're using, so designing and saving different layouts for different tasks becomes very important.

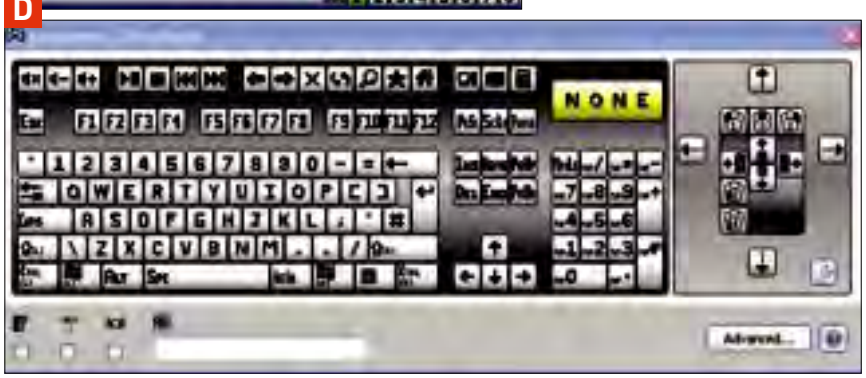
You can use different calibrations for different games, one for movies, one for music, and one that allows you to use your controller as a point-and-click mouse. Image D shows that calibration in progress.

As you can see from the image, this calibration is extremely straightforward. You can move the mouse around with the left joystick, the A button is the left mouse button and the B button is right-click. Easy enough. Let's try something more complex by adding to our mouse configuration.

Image E shows a "Windows Media" configuration, and functions much like an Xbox controller would if you popped a DVD into your console. In order to do this, we looked up all of the hotkey commands for Windows Media Player, and typed in the ones we need on the controller layout. The right-shoulder button is now fast forward, the left rewinds, the triggers skip scenes, and the start button pauses the movie. The analog stick is still configured to function as a mouse, and we've even calibrated the D-pad to raise or lower the volume. Now, we can simply save this configuration to our desktop and use it whenever we're ready to watch a DVD. To access it, we would simply double-click the file and it would launch Xpadder to dictate the operations of our controller.

This doesn't just apply to movies, either. Many popular games won't recognize a console controller. Don't believe us? Try using your Xbox controller with Modern Warfare 2 or Battlefield 2. With Xpadder, you can design a configuration that will work with any game, regardless of whether the developers want you to or not; save it, and use it any time you need to.

D



Make Super-Cheap Phone Calls with VoIP

One of the topics we get asked about most often is VoIP (short for Voice over Internet Protocol), or Internet telephony. VoIP refers to any service that lets you make "phone calls" online. A lot of people have heard that you can make calls for cheap or even for free using VoIP, but they've got questions about how it works.

There are three main forms of Internet phone calls. We'll explain each type, how it works, and how much it'll cost you.

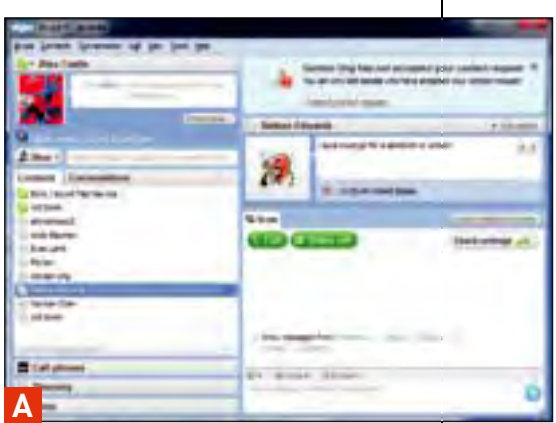
–ALEX CASTLE

PC TO PC

WHAT IT IS: You want to make a phone call to your old college buddy. He lives in Seoul now, and you both have computers. How much should it cost you?

If you answered anything but "nothing," you're wrong. Pretty much any VoIP software will allow you to make voice or video calls to other users of the service for free. This is the Internet, after all, and you already pay for your bandwidth.

HOW IT WORKS: There are plenty of clients that let you voice chat over the Internet. If you'll be using VoIP regularly, we recommend Skype (image A). It's the most popular client for a reason—it's full featured, easy to use, and totally free. If you just want to make the occasional call, you can use the voice/video chat function in Gmail, which runs right in your browser (though you'll have to download a plugin).


A

WHAT IT COSTS: Nothing.

PC TO PHONE

WHAT IT IS: Although PC-to-PC calling is a great option (and free!), it's unlikely that everyone you want to talk to is going to want to go through the effort of installing Internet phone software and talking with a headset. If you have older relatives abroad who you want to talk to, you're probably going to need to be able to make PC-to-telephone calls.

B

HOW IT WORKS: Plenty of companies offer "softphone" software that allows you to make calls to landlines or mobile phones—for a fee, which is based only on the country you're placing the call to (image B). The complicated part is that there are tons of VoIP companies competing for your money, and each one has different rates for every country. To get the best rates, you need to do some research ahead of time, using Google or a comparison site like www.cheapest-voip.com. Once you've found a site with a good rate for the country you want to call, be sure to look for user reviews—some VoIP companies have shady reputations.

Some services, like Skype, also offer a monthly unlimited plan, which might prove cheaper than metered billing if you make frequent overseas calls.

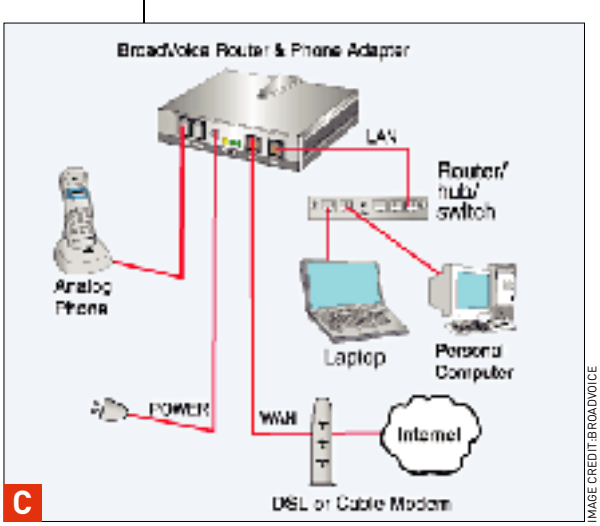
WHAT IT COSTS: A couple of cents per minute to most countries, if you find the best deal.

PHONE TO PHONE

WHAT IT IS: To get a full phone-to-phone VoIP experience, you'll generally want to sign up with an Internet phone service. These services provide you with the same experience as a landline, including the use of most handsets, caller ID, and voicemail. You can make and receive local and long-distance calls on your home phone.

HOW IT WORKS: Generally, you sign up with an Internet phone provider like Vonage or BroadVoice, which provides you with a small VoIP modem that connects to your router and your handset (image C). You pay a monthly fee, just like with a regular landline, except that most services offer unlimited long distance or a very low per-minute rate. You can use a phone with multiple wireless handsets to get house-wide coverage with just one VoIP modem.

WHAT IT COSTS: $20/month and up for unlimited calling.



C

IMAGE CREDIT: BROADVOICE

Host an FTP Server

One of the oldest ways to send and receive files on the Internet is FTP, and although almost everyone has connected to an FTP server at some point or another, most people have never set one up. While there are several options for FTP server software, we prefer FileZilla, which offers a streamlined interface, and most importantly, is completely free (most other companies only offer a trial period before charging you). Here's how to use it. –ALAN FACKLER

INSTALL THE SERVER

First, you'll need to download the FileZilla server software at www.filezilla-project.org. After you've finished the quick download, install the server software. The first time you run the server program, you will be provided with your own server address and port number. Write these down, you'll need them later.

A

As you'll see, a server by itself is pretty unremarkable (image A), but that's kind of the point. The client is what allows you to manipulate the server's storage capabilities. But before you open your client, you'll need to configure a user account to connect with.

CREATE A USER ACCOUNT

Scroll over the Edit tab located up top, and select Users. In the top-right corner of the newly opened window will be (surprise) a tab called Users. Click the Add button to create a user name and a password. Be aware that FTP is an unsecure connection—files and passwords are sent as plaintext and are therefore vulnerable to interception.

B

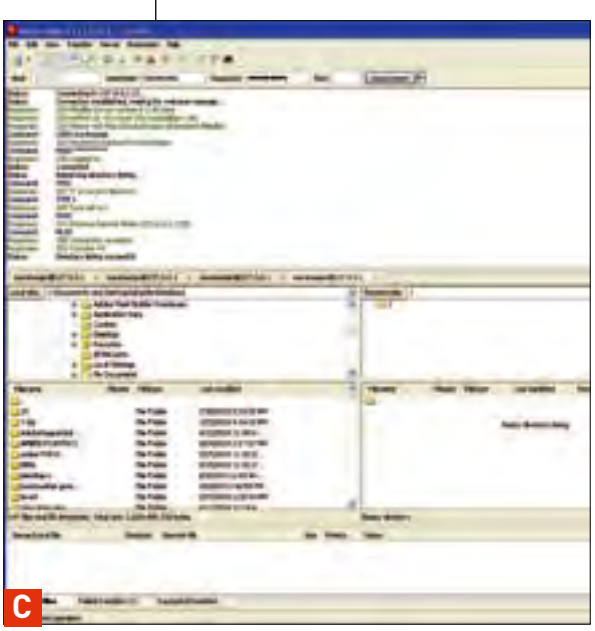
That's why we don't recommend using FTP to transfer sensitive files, and why you should not use a password for an FTP account that you use for anything else.

In the Users tab you also have the ability to create a home directory for each user account (image B). Do this, and point to a directory somewhere on your system. These will be the files that anyone connecting with that user account can interact with. The Files settings box contains file permissions. By setting these you could, for instance, create a read-only account that can access your music collection from other computers, but can't make any changes to it.

CONNECT TO YOUR SERVER

Now it's time to begin using your client (image C). Installation is as quick and painless as with the server, but once open, you're going to need to enter the information you received and configured previously—host name, username, and password. The host name is the IP address of your server. If you have a dynamic IP, you can use a service like DynDNS.org to create a good-as-static hostname for your server. Enter your information and hit the Quickconnect button to access your server.

Once in, you now have the ability to drag and drop items from your local computer (displayed on the left side of the server screen) to your remote site (displayed on the right side). You can now access your files from wherever you need them.


C

REVIEWS

Tested. Reviewed. Verdictized.

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ONLINE

- EVEN MORE REVIEWS!
-
-
- BEST OF THE BEST

Acer Predator AG7750-U2222

Can the Predator lock a three-dot-laser designator on Alienware's head?

Last year, Acer officially bumped Dell from its status as the No. 2 PC maker in the world, and now Acer is hoping that its Predator can hunt down one of Dell's most prized brands: Alienware.

No, we are not making this up. It's literally Alienware vs. Predator. Sure, we're writing this while listening to that bootleg of the *Predator* soundtrack that made the rounds in the 1990s, but c'mon, what else could you think after seeing Acer's Predator case?

Besides probably getting Stan Winton's estate to call the lawyers, the Predator can draw a crowd. In fact, when we unboxed the Predator, a small crowd of gawkers formed to take a peek. That rarely happens with this jaded bunch, even for some of the $8,000 gaming rigs we see in the Lab. And once we ripped off the Predator's mask and fanned out the two crab-like optical-drive arms, it was hard not to yell, "You are one ugly mother…!" Well, you get the point.

Inside the Predator, the guts are sadly of this Earth and pretty pedestrian. The full specs are available below, but the highlights are an Acetek water-cooled, stock-clocked 2.8GHz Core i7-930, 12GB of DDR3/1333, and a GeForce GTX 470. Acer configured this machine as a midrange box, so there's no SSD and no SLI. It is SLI-ready, though.

We didn't have time to get a current Alienware rig for a remake of *AvP*, but even the specs of the Alienware Aurora ALX we reviewed in February are enough to take out the Predator. That's all conjecture as we no longer have that machine for a true showdown, but the Alienware's 3.33GHz Core i7-975 Extreme Edition and two Radeon HD 5870s trump a 2.8GHz Core i7-930 and GTX 470. We have to mention that said Alienware carried twice the price tag. But while performance comparisons between the Alienware and Predator would be unfair, build comparisons are valid. Between the two chassis designs, Alienware's is the victor with its motorized vents and lighting system. The Predator case, while head-turning, is a serious pain to get into. You have to remove the geared face-mask and arms just to crack the side open.

The arms of the optical drives swing out very much like a crab—or Predator!

So how does the Predator compare with our zero-point? The latter's Radeon HD 5970, Intel SSD, and Core i7-920 ticking along at 3.5GHz hit the Predator with the firepower of a man-portable mini-gun. Granted, our zero-point's parts total about $2,500 today, compared with the Predator's $2,000. But the

SPECIFICATIONS

Processor	Intel 2.8GHz Core i7-930
Mobo	Custom ATX board using X58 chipset
RAM	12GB DDR3/1333 in tri-channel mode
Videocard	GeForce GTX 470
Soundcard	Onboard
Storage	One 1.5TB Western Digital W15EADS
Optical	Lite-On DH16AASH
Case/PSU	Custom/FSP 750 watt

BENCHMARKS

	ZERO POINT	
Vegas Pro 9 (sec)	3,049	3,832 (-20%)
Lightroom 2.6 (sec)	356	443 (-20%)
ProShow 4 (sec)	1,112	1,445 (-23%)
Reference 1.6 (sec)	2,113	2,728 (-23%)
STALKER: CoP (fps)	42.0	25.1 (-40%)
Far Cry 2 (fps)	114.4	69.9 (-39%)

0 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our current desktop test bed consists of a quad-core 2.66GHz Core i7-920 overclocked to 3.5GHz, 6GB of Corsair DDR3/1333 overclocked to 1750MHz, on a Gigabyte X58 motherboard. We are running an ATI Radeon HD 5970 graphics card, a 160GB Intel X25-M SSD, and the 64-bit version of Windows 7 Ultimate.

Predator can't even rip out the skull and spine of the $1,400 budget gaming box we built this month (page 30).

We realize we need to recalibrate our gaming benchmarks for midrange systems. The Predator looks like its frame rates are anemic but that's because our benchmarks are run at 2560x1600—a res that probably only 5 percent of people game at, and which practically mandates a dual-GPU or multicard setup. The Predator should run anything out today and tomorrow comfortably at 1920x1080. In the plus column, the Predator's BIOS supports overclocking and we pushed the Predator up to 3.5GHz with little effort. We're pretty sure it'll reach 4GHz with more testing.

So, what's the final verdict? While radical in looks, the Predator actually plays it very safe. That's not a surprise coming from a tier-1 PC maker, as they tend to play it safe and reliable rather than let it all hang out. Still, Acer played it a bit too conservative and perhaps a bit too budget with the Predator. If it's truly going after Alienware, its machines are going to need to be loaded for, umm, aliens.

—GORDON MAH UNG

VERDICT 6

ACER PREDATOR AG7750-U2222

+ MINI-GUNS	− MINI-WHEATS
Head-turning case.	Painful to crack the case open; where's the SSD?

$2,000, www.acer.com

The Predator is "SLI-ready," so it can take a second GeForce GTX 470.

RevoDrive 120GB PCI Express SSD

Windows on our PCI-E SSD?

OCZ Technology is on a roll. While most consumer SSD manufacturers are content to just slap the latest controller and some NAND into a 2.5-inch enclosure and call it a day, OCZ has been pumping out innovative products, from top-of-the-heap SATA SSDs to the blistering-fast (and stylish) USB 3.0 Enyo drive. Now it has introduced the RevoDrive, a PCI-E SSD in capacities from 50GB to 480GB. Though it's not the first PCI Express SSD (Fusion-io's been making enterprise-level PCI-E SLC devices for years), it is the first bootable consumer PCI-E SSD. OCZ claims the RevoDrive can hit up to 540MB/s reads and 450MB/s writes, which sounds like nonsense. But is it?

The RevoDrive is a x4 PCI Express card containing a Pericom PI7C9X130 PCI-E-to-PCI-X bridge, a SiliconImage SiI3124 PCI/PCI-X-to-SATA controller, two SandForce SF-1200 controllers, and 120GB of NAND flash—it's effectively two 60GB Vertex 2 drives in RAID 0 on a single PCB. Installation is easy, though as of press time, the drivers lack an executable file and need to be installed via Device Manager, unless you're installing Windows on the drive, in which case they can easily be F6'd at install. The SiliconImage BIOS is accessible during POST, so you can wipe and restore the RAID manually should you so choose. The default stripe size is 64KB as all our tests were run at that size.

Because the Trim command doesn't pass through RAID controllers, you'll have to rely on the SandForce controllers' built-in garbage collection utilities. In our tests, repeated abuse did slow the RevoDrive in some tests. After several days of heavy (and unrealistic) use, average sustained reads in HDTune dropped from 300MB/s to 240MB/s, while average sustained writes dropped from 267MB/s to just 175MB/s—worse than a single Vertex 2 drive. However, as OCZ points out, HDTune is a queue-depth 1, low-level hardware benchmark for unformatted drives that doesn't deal well with RAID. Our Premiere Pro encoding times slowed from 337 seconds to 358 seconds. PCMark Vantage HDD subscores remained above 44,000, and our IOMeter 4KB random write test, at queue-depth 32, hit above 80,900 IOPS—that's 316MB/s, or 65 percent faster than the 48,900 IOPS we saw from a single Vertex 2.

Where are the advertised 540MB/s reads and 450MB/s writes? We didn't see them in the low-level benchmarks we typically use. Instead, we had to look to ATTO Disk Benchmark, which tests drive performance over a variety of read and write sizes from 500 bytes to 8,192KB. Lo and behold: For larger file sizes (512KB and above), ATTO recorded read speeds above 540MB/s and writes above 460MB/s. Our 100GB Vertex 2, by comparison, got around 285MB/s read and 274MB/s write on the same test.

Is the RevoDrive a practical solution for home users? High queue-depth IOPS are more useful for servers than for day-to-day use, and the absence of Trim is palpable, though OCZ claims to be to working on adding Trim support. Depending on the benchmark, the RevoDrive's performance ranges from nearly twice as fast as a single Vertex 2 to slightly worse. But its performance at queue depths greater than 1 never falters, and in those scenarios it crushes all comers.

The RevoDrive comes in capacities from 50–480GB. The 120GB version we tested currently retails for $370; a 120GB Vertex 2 is $310. Given the lack of Trim and the fact that most home use doesn't require high queue-depth performance, most people should go for a single SATA SandForce drive. A price drop and Trim support, though, could turn this from a decent and intriguing product to a must-have.

—NATHAN EDWARDS

VERDICT 8

REVODRIVE 120GB PCI EXPRESS SSD

+ SCIENCE	− MAGIC
Phenomenal queue-depth performance and random reads/writes; bootable; trumps single SandForce in many benchmarks.	No Trim; drive slows down after heavy use.

$370, www.ocztechnology.com

BENCHMARKS

	OCZ 120GB RevoDrive (PCI-e x4)	Vertex 2
Capacity	120GB	100GB
HDTune 4.01		
Avg Read (MB/s)	**243.0**	196.3
Random-Access Read (ms)	**.0**	.1
Burst Read (MB/s)	175.2	**228.0**
Avg Write (MB/s)	175.3	**221.9**
Random-Access Write (ms)	.2	**.1**
Burst Write (MB/s)	207.4	207.5
4KB Read (IOPS)	10,600	**11,045**
4KB Write (IOPS)	**10,275**	10,066
IOmeter Random-Write IOPS (4KB, Queue Depth 32)	**80,958**	48,958
Premiere Pro (sec)	358	359
PCMark Vantage HDD	**44,450**	39,309

Best scores are bolded. All drives tested on our hard drive test bench: a stock-clocked Intel i7-930 CPU on an Asus P6X58D Premium motherboard with 6GB DDR3, running Windows 7 Professional 64-bit. All 3Gb/s tests performed using latest Intel ACHI drivers.

It's the first bootable consumer PCI-E SSD, but lack of Trim hurts performance over time.

Cooler Master HAF X

The HAF full-tower gets updated for 2010

The HAF X is the third case in Cooler Master's High Air Flow lineup: The full-tower HAF 932 won our Kick Ass award in November 2008, and we continue to admire the mid-tower HAF 922 we first saw in October 2009—the red version is in this month's cover story. With the HAF X, Cooler Master updates the full tower for 2010.

At 21.7x23.2x9.1 inches, the HAF X is barely bigger than the mid-tower HAF 922 and a full inch shorter and shallower than the Corsair 800D, yet it's still roomy enough to fit a 12.1-inch graphics card. The HAF X's rolled-steel frame and plastic bezels hew closely to the HAF series' lines, and the internals offer few surprises. As we'd expect, there are plenty of large fans: a front 23cm red LED fan, top and side 20cm fans (and room for another at the top), and a 14cm rear exhaust. In lieu of two 20cm fans, the top panel can accommodate a triple radiator and its 12cm fans.

Cooler Master knows how to build cases, and the HAF X takes plenty of cues from the rest of CM's lineup. The HAF X contains four 5.25-inch bays with CM's toolless retention mechanism and three without. The bottom two bays hold a two-drive hot-swap SATA bay, below which are five of Cooler Master's toolless 3.5-inch trays, one of which includes a drive-bay adapter for two 2.5-inch drives. A giant CPU backplane cutout and grommeted cable-routing holes are now standard.

The HAF X does have a few new features, including front-panel USB 3.0 ports—the cables are mere pass-throughs to the mobo's rear USB 3.0 ports (there is not yet a USB 3.0 mobo header standard). The HAF X also includes an optional fan cowling for Nvidia's GTX 400 series, which channels air directly to the giant heatsinks on those cards, and which can accommodate an extra 12cm fan for more oomph.

At $200, the HAF is priced competitively given its feature set. It's neither the roomiest nor the most polished case, but the High Air Flow moniker is well-deserved, and we appreciate the forward-thinking additions Cooler Master has made. —NATHAN EDWARDS

Yep, those are USB 3.0 front-panel headers you spy at the top of this picture.

VERDICT 9

COOLER MASTER HAF X

+ HAF FULL	− HAF EMPTY
Front-panel USB 3.0, hot-swap SATA, plenty of airflow.	Dust filters don't slide out; could use more cable-routing cutouts.

$200, www.coolermaster.com

Gigabyte GV-N460OC-1GI GTX 460

It will please your gaming soul without breaking your budget

Does a paltry 256MB of RAM matter? Apparently, it does, if you're talking about Nvidia's GF104-based GTX 460 cards.

In the October issue, we took a long look at Asus's sweet GTX 460 768MB card. While that card impressed us for the most part, it did seem a little weak in a few areas, especially when you turned up antialiasing. This 1GB version isn't just the same chip with another 256MB of GDDR5 memory slapped on.

The memory bus is actually wider than the 768MB card, at 256 bits wide instead of 192 bits wide. That extra bus width is managed by a fourth memory controller on board the chip (the 768MB card has only three memory controllers.) If you're thinking that the 1GB version of the GeForce GTX 460 should have had its own model—perhaps GTX 463—you're not alone. A lot of people have wondered why Nvidia would use the same nomenclature for these two different beasts. The chip itself is the same. The 1GB chip is based on TSMC's 40nm process technology, and has the same 1.95-billion transistor count as the 768MB version.

Gigabyte's card also offers up a customized cooling solution, with two fans running on top of two copper heat pipes. Despite the extra fans, this is by no means a noisy card, even under heavy load. The two fans keep the factory-overclocked GTX 460 GPU running cool; the core clock runs at 715MHz (stock is 675MHz) while the shader clock hums along at 1,430MHz (the standard shader speed is 1,350MHz). Gigabyte keeps the memory clock at the reference 900MHz (3,600MHz effective).

Despite dual fans, the 1GB Gigabyte GTX 460 is actually fairly quiet.

Despite the faster core clock, Gigabyte suggests the GPU actually runs 5 percent to 10 percent cooler due to its customized cooler, which the company calls "WindForce."

The combination of higher core and shader clocks, plus the wider memory bus and added memory controller definitely has an effect on performance. That's evident in our benchmarks, which put the Gigabyte GTX 460 ahead of the 768MB Asus version as well as a pricier PNY GeForce GTX 465 and ATI's Radeon HD 5830 card. The larger frame buffer and higher clocks also cost you in power consumed, but it's still far short of the PNY GeForce GTX 465.

You can find the Gigabyte GV-N460OC-1GI for roughly $230 online. That's actually close to the Nvidia suggested price for standard-clocked cards, so it's a superb value. Pop in two of these in SLI mode, and you get excellent scalability for higher resolutions with antialiasing turned up—all for less than the cost of a single $500 GTX 480.

It's looking like Gigabyte's take on the GTX 460 1GB is a real winner. It's definitely worth a look if you're building an affordable gaming rig. This card seems to hit the price/performance sweet spot in spades.

—LOYD CASE

BENCHMARKS

	Gigabyte GTX GV-N460OC-1GI	Asus ENGTX 460 TOP	PNY GeForce GTX 465	Radeon HD 5830
Unigine Heaven 2.0 (fps)	**19**	18	**19**	13
Battle Forge (fps)	36	38	39	**40**
Dirt 2 (fps)	**66**	59	57	45
Far Cry 2 / Long (fps)	**76**	68	66	47
Far Cry 2 / Action (fps)	**61**	56	56	42
Tom Clancy's HAWX (fps)	**69**	63	**69**	50
Crysis (fps)	**21**	19	19	**21**
Just Cause 2	**32**	30	31	26
Aliens vs Predator DX11	**23**	21	22	20
STALKER: Call of Pripyat (fps)	**30**	25	26	26
System Power Usage (Idle)	**131**	137	146	137
System Power Usage (load)	256	**241**	285	**241**

Best scores are bolded. Our test bed is a 3.33GHz Core i7-975 Extreme Edition in an Asus P6X58D Premium motherboard with 6GB of DDR3/1333 and an 850TX Corsair PSU. The OS is 64-bit Windows Ultimate. All games are run at 1920x1200 with 4x AA.

MAXIMUM PC KICK ASS!

VERDICT 9

GIGABYTE GV-N460OC-1GI

+ DARK KNIGHT	− BATMAN AND ROBIN
Factory overclocked; excellent performance for its price; relatively quiet under load.	You'll want a second card if you want to hit 45fps or better at higher resolutions.

$230, www.gigabyte.com

Logitech Alert

Time for an upgrade!

We're longtime fans of Logitech's Wi-Life security cameras—they've protected Maximum PC Lab North since the home was built in 2007. Now we can't wait to retire that system and replace it with Logitech's all-new and vastly superior Alert system.

Logitech wisely carried forward everything we dug about the old Wi-Life system: The indoor and outdoor cameras are equipped with multi-zone motion sensors, they can be programmed to record video when those sensors are activated, and the software sends alerts via email (or a message to your phone) with video clips attached.

Everything else about the system has been greatly improved, starting with the cameras themselves. The shell of the outdoor model is fabricated from zinc (the original models are plastic), and its power supply and network interface components are contained in a separate, weather-resistant module. On the upside, this design renders the camera less susceptible to heat; on the downside, it leaves you with a large box to mount next to your electrical outlet. The outdoor camera's best new feature, though, is its integrated night vision.

The new indoor camera does not have night vision, and it relies on an unsightly power supply/network adapter. Both the indoor and outdoor models are equipped with microphones, so you can record sound as well as video, but there is no provision for two-way audio.

The Alert system is based on the updated HomePlug AV standard, which delivers TCP throughput of 150Mb/s (under ideal conditions) and is a big improvement over the first-gen HomePlug tech Wi-Life cameras use. This, combined with improved optics on the cameras, enables the Alert system to deliver high-definition (960x720) video at 15 frames per second.

Logitech has altogether eliminated the need for a host PC: Each camera is equipped with a MicroSD memory-card slot and stores its video clips locally. (Logitech provides 2GB MicroSD cards, but the cameras can host memory cards as large as 32GB.) The HomePlug-to-Ethernet adapter connects directly to your router. When you do run Logitech's Commander software on a local PC to monitor the cameras live or to play back recordings, the software automatically backs up all the cameras' videos to the PC's hard drive.

You can watch a live feed from any of your cameras remotely via the Web or with a free app for your iPhone, Blackberry, or Android device. If you wish to manage the system or play back recorded video from a remote location using a PC or smartphone, you'll need to spring for Logitech's Web Commander/Mobile Commander package, which costs $80 per year.

Logitech Alert is relatively expensive compared to the typical IP camera: The indoor master system goes for $300 and the outdoor master system costs $350, while each add-on indoor and outdoor camera will set you back $230 and $280, respectively. But when you consider the cost of weatherized enclosures so you can mount your IP cameras outdoors, the hassle of running Ethernet cables, and the need for a dynamic DNS service so you can view your IP cameras remotely, Logitech Alert doesn't look so pricey. The Alert's superior video resolution, remote-viewing capabilities, alert features, and local storage further sweeten the deal. This is one fabulous video-surveillance system. **–MICHAEL BROWN**

MAXIMUM PC KICK ASS!

LOGITECH ALERT

VERDICT 9

+ SURVEILLANCE	– EAVESDROPPING
HomePlug AV power-line networking; no need for a host PC 24/7; free remote viewing.	Limited to six cameras; subscription fee for remote viewing of recorded video.

Master systems $300 to $350; add-on cameras $230 to $280; www.logitech.com

If you're willing to recycle your old Wi-Life cameras, Logitech provides a 20-percent discount on the purchase of its vastly superior Alert system.

Hitachi LifeStudio Plus 500GB

It's better to do one thing well

Ever heard the phrase, "Do one thing, and do it well?" Hitachi surely has. The company took that advice, considered it, threw it out the window, and released an external backup drive bundled with a media suite that does many things—some of them potentially interesting, but none of them particularly well. The Hitachi LifeStudio Plus is an external backup drive with an interesting dock, a cool companion USB key, and a clunky, awkward integrated software suite.

The hardware itself is attractive, in a retro, family-friendly sort of way. It consists of a black (or white) docking station that holds a removable 2.5-inch external drive (in tasteful grey and light blue, graphite, or white), and a 4GB USB flash drive. The removable hard drive slots onto a mini-USB connector, but the flash drive connects magnetically. When connected, the drive automatically syncs with a folder or folders of your choice. Ideally. In practice, it's very good at syncing files from your computer to the flash drive, but it doesn't work the other way. Despite checking the requisite boxes on the settings menu, the so-called "MyKey" refused to copy files from the flash drive to the folder it was allegedly synched to, which makes the whole thing much less useful than it should be.

Speaking of the settings menu: The LifeStudio is bundled with an eponymous media suite powered by Cooliris that's supposed to be your main interface with the drive. You use the LifeStudio suite to view photos and videos, listen to music, and more, via Cooliris's "3D wall" visualizer. It's a cool interface, though it was somewhat laggy on our Core i7-930 machine with a Radeon HD 5850 card. Your content, which is backed up—including multiple revisions—from wherever you choose (the Users folder is the default), is then sorted by date, id3 tag, or other metadata and displayed on the Cooliris wall. The bundle also includes 3GB of free online backup and up to 250GB for $50/year, powered by Memopal. The suite also offers a great social interface: You can see photos from your Facebook friends, upload your backed-up photos to Picasa, Flickr, or Facebook, and share what you're doing on MySpace, LinkedIn, Twitter, or Facebook.

Cooliris also lets you browse "premium content," or streaming TV shows, music videos, and movie trailers—all in really crappy quality at about 15fps—as well as news from the AP and USA Today, Flash games, and a "shopping channel." Each 3D-wall visualization, in every context but your own content, regularly displays enormous advertisements. The "premium content" is nothing you can't find, also for free, on Hulu or any of its network-specific clones. The music videos are extremely limited and poppy, and the Flash games are uninspiring.

We dig the dock, and the magnetic grip for the USB device. Too bad the software tries to do too much.

The big promise of LifeStudio is the ability to simplify, to replace a half-dozen apps with one perfectly synergistic bundle. But that only works if using the omnibus solution is better than using those half-dozen apps. The Cooliris interface is a great way to view your media, and it's available as a stand-alone program as well as a browser plugin. But Hitachi's sync software isn't great, and the excellent idea of a snap-on flash key that easily syncs with your drive (or computer) is hampered by the terrible software implementation. Even the online backup is harder than it needs to be. The online storage isn't better than Dropbox, the MyKey syncing mechanism doesn't work as well as using SyncToy, and viewing video through the Cooliris interface isn't anywhere near as good as using Hulu Desktop or even a web browser.

The LifeStudio Plus, with its easy-to-use dock, attractive styling, and snap-on USB key, is a cool product. But the bundled software somehow manages to be less than the sum of its parts, and doesn't accomplish anything that can't be done better by other applications.

—NATHAN EDWARDS

VERDICT 6

HITACHI LIFESTUDIO PLUS 500GB

+ LIFE (CEREAL)	− LIFE (BOARD GAME)
Neat hard drive dock; cool flash-drive magnetic interface.	Clumsy bundled software; MyKey doesn't sync correctly.

$130 (500GB w/4GB USB key), www.hitachigst.com

Prolimatech Armageddon

I don't know about you, but Armageddon excited

As brands go, Prolimatech is a new one. The company has only been around since 2008, after all, and it offers a bare handful of products. But the company was founded by people who clearly know a lot about CPU cooling, as it's accrued considerable cred in just a couple of years. Its best-known cooler, the Megahalems, was designed for overclocked 1366 chips. We told Prolimatech about our new Socket 1156 cooling test bed, and the company sent over a newer cooler, ominously named Armageddon.

At 5.6 inches wide by 2 inches thick by 6.3 inches tall, the Armageddon is wider but slimmer than our champion air cooler, the CM Hyper 212+ (reviewed in the Holiday 2009 issue). While the Hyper has four direct-contact copper heat pipes, the Armageddon's six heat pipes run through a more standard heat exchanger and up through a stack of heat-dissipation fins. The Armageddon's mounting system is a bit complex—requiring a backplate, three retention bars, four bolts, four o-rings, four double-headed thumbscrews, four nuts, and two spring screws. But the end result is a stable, solid install with no give and no potential pressure- or torque-related failure points.

The Armageddon supports up to two fans, either 12cm or 14cm, but preferably the latter. In an unusual move, the cooler doesn't ship with any fans, though Prolimatech shipped us two of its 14cm, 1,000rpm Vortex fans. It's not that the Armageddon is intended to be fanless—Prolimatech gives you the freedom to add whichever fans you want, preferably its own. We used both Vortex fans to test the Armageddon in push/pull configuration. In the interest of fairness, we added another fan to the Cooler Master 212+, too—we had a spare 212+ around, so we borrowed one of its CM fans.

With two 14cm fans in push/pull configuration, the Armageddon trounced the Hyper by 6.5 C—oddly, using two of the Hyper's stock fans instead of one barely helped the Cooler Master heatsink at all. In mounting-bracket security, looks, and two-fan performance, the Armageddon surpasses our champion. But the Prolimatech cooler costs $65 without fans. Add $28 for the two fans we tested it with, and you're looking at more than $90 for a CPU cooler. Value-for-dollar, you still can't beat the Cooler Master 212+. But the Armageddon is a powerful and worthy cooler with a satisfyingly solid mounting mechanism, quiet fans (sold separately), and a lot of oomph. —NATHAN EDWARDS

MAXIMUM PC KICK ASS!

VERDICT 9

PROLIMATECH ARMAGEDDON

+ A BANG	− A WHIMPER
Powerful and quiet cooling in push/pull with recommended fans; fantastic fan clips; solid mounting bracket.	Pricey; fans sold separately.

$65 ($93 w/two fans), www.prolimatech.com

BENCHMARKS

	Prolimatech Armageddon (two fans)	Cooler Master Hyper 212+ (two fans)	Cooler Master Hyper 212+ (one fan)	Stock Cooler
Idle (C)	33.5	**32.25**	36	46.75
100% Burn (C)	**53.25**	59.75	60	88.5

Best scores are bolded. Idle temperatures were measured after an hour of inactivity; load temperatures were measured after an hour running Intel's internal Lynnfield thermal testing utility at 80 percent load. Test system consists of Intel Core i5-750 overclocked to 3.2GHz on an Asus P7P55D Premium board in a Corsair 800D case with stock fans. Temperatures measured via HWMonitor.

The Armageddon doesn't come cheap, and the Vortex 14cm fans cost an extra $14 each, but the performance speaks for itself.

Kaspersky Internet Security 2011

Offers more protection than a pack of pit bulls

A part of us wishes Kaspersky Internet Security 2011 came bundled with its own aluminum foil deflector beanie (http://bit.ly/1xtkVT), because it's the only thing missing from what's otherwise the ultimate package for paranoid PC users. Put another way, running Kaspersky is like sitting in a panic room behind a three-inch steel-frame door with multiple deadlocks, and toting a sawed-off shotgun just for good measure. Do you see where we're going?

Out of the box, Kaspersky comes ready to throw down with any malware feeling froggy enough to jump. Almost as if trying to prove a point, Kaspersky wouldn't even allow us to visit our synthetic spyware site (www.spycar.org) until we configured the web module to chilax and let us poke our head into suspicious web portals. Not that it mattered, because Kaspersky was unfazed by each of Spycar's attempts to hijack our browser and simulate other malicious behavior.

We again had to disable the web module in order to download our dirty archive brimming with real malware, and once more Kaspersky shrugged off our shenanigans by keeping the lid tightly closed no matter how hard we tried to open it.

This is only the half of it, folks. All of our testing was performed with Kaspersky's default security settings. Digging through the plain-English UI, we found that we could increase the security level for File, Mail, and Web from medium to high. Kaspersky only offers vague descriptions as to what these levels do, but the way it performed at default, we wouldn't be surprised if increasing security to high resulted in Kaspersky sending a security consultant to your home to watch over your shoulder.

All this and we've still only scratched the surface. Do you have a sneaky suspicion that Bob from accounting installed a keylogger on your machine, but you just can't prove it? Kaspersky includes a virtual keyboard to prevent Bob, or foreign hackers, from recording your keystrokes as you log into banking sites or anywhere else you want extra peace of mind. If your paranoia runs even deeper, Kaspersky's "Safe Run for Websites" option adds an additional layer of protection to your surfing session, sort of like a souped-up private browsing session. Cookies, history, and other details are kept secluded from the OS so they can't be exploited, and then are nuked when you exit the browser.

Underneath Kaspersky's unassuming UI sits a whirlwind of protection.

Kasperky's Safe Run feature also extends to the desktop. If you're unsure about that screensaver you just downloaded, the Safe Run option—found in the right-click context menu—runs the program in a virtual environment. This sandbox mode isolates the potentially unsavory app from making changes to the OS, and adds a layer of privacy—IMs, emails, and other communications are deleted once you exit the app.

On top of all these security shields, Kaspersky rounds out its package with a toy box of tools that includes a downloadable ISO to create a rescue CD or USB key, a vulnerability scan to alert you to potential security holes with your system/programs, a privacy cleaner (vacuums up your various caches), and a browser diagnostic for IE users. There's even a system restore utility that searches for problems caused by malware and then offers to roll back changes, but if you manage to circumvent Kaspersky's protection in the first place, then you're doing something seriously wrong.

—PAUL LILLY

DARE TO COMPARE: PERFORMANCE

	Kaspersky	Norton	ESET	McAfee	MSE
Scan 1 (min:sec)	35:43	16:18	**7:45**	13:33	16:56
Scan 2 (min:sec)	8:05	**4:47**	7:43	6:45	16:56
PCMark	5,582	5,760	**6,067**	5,645	5,622
Boot (seconds added)	+22	+18	+12	+13	**+9**

Best scores are bolded. Our test bed is a Core 2 Quad Q9400, 8GB DDR2/800, a Seagate Barracuda 320GB 7200.10 (~60GB filled across two partitions), a Radeon HD 3650, and Windows 7 Professional 64-bit. The reviewed app is compared to the top-performing apps from our AV showdown in the May 2010 issue (see http://bit.ly/cB6sqN).

MAXIMUM PC KICK ASS!

VERDICT **9**

KASPERSKY INTERNET SECURITY 2011

+ SAFE ROOM	− PANIC ROOM
Protects against a variety of threats; sandbox mode; virtual keyboard.	Scan times could be faster.

$80 (three PCs), www.kaspersky.com

StarCraft II: Wings of Liberty

Long-overdue sequel offers classic RTS gameplay

Prior to StarCraft II's release, there was a lot of wailing and gnashing of teeth over Blizzard's decision to split StarCraft II across three games. "Why pay full price for a third of a game?" was the not-unreasonable question. Fortunately, after playing a lot of StarCraft II: Wings of Liberty, we can tell you that this is emphatically not a third of a game. In fact, it's the most polished, full-featured single- and multiplayer RTS we've ever played.

The action in the single-player game takes place across 29 missions, all but four of which see you leading space cowboy Jim Rayner's band of mercenaries into combat. Though you're limited largely to the Terran race, StarCraft II's incredibly polished level design makes every mission feel like a completely different experience, from a zombie invasion to a mission where you must build up a force while on the move, always keeping one step ahead of a steadily advancing firestorm.

The story is pure sci-fi schlock, but the presentation is a lot more immersive than the first game's talking-heads approach. Between missions, you can explore Rayner's capital ship and base of operations, the Hyperion.

Between missions, Jim Rayner hangs out in his command ship, the Hyperion.

Onboard, you can buy improvements for your units in the armory, recruit new mercenary factions in the cantina, research new technologies in the lab, and discuss coming missions on the bridge. All the unit customization and research, combined with a large number of single-player-only Terran units, means you get to create a highly personalized force to take into battle.

This is still StarCraft, and Siege Tanks still blow up Zerg like it's going out of style.

Despite all the single-player game embellishments, the multiplayer game is a no-nonsense affair. Each of the three playable races has about 14 units—very close to the number found in the first StarCraft, post-expansion. Although there has been some significant shuffling of units and abilities, Blizzard has been careful not to mess around with the core of StarCraft gameplay.

Like the first game, multiplayer in StarCraft II isn't for the faint of heart. There's a very steep learning curve, and until you've played at least a couple dozen games and done some serious reading up on strategy, you're going to get the living daylights stomped out of you by any halfway-decent player

Because sometimes one flamethrower just isn't enough, you can buy permanent upgrades for your units in the campaign.

online. There's no way to get a "lucky win" in StarCraft.

Fortunately, Blizzard has recognized that vicious, tooth-and-nail competition can be intimidating, and the developers have gone out of their way to introduce a number of features to make it easier for new players to adapt to the online environment.

First, they've added a number of single-player challenge missions, which focus on simple, online-applicable skills like rush defense, unit counters, and macro- and micromanagement.

Second, new players are given the option to play up to 50 practice games before being thrust into the official online league. These practice games run at a slower speed and use modified maps, which makes early attacks impossible.

Finally, Blizzard has split the online ladder system into five leagues—Bronze, Silver, Gold, Platinum, and Diamond—and when you play, you're matched against other players in your league. Each league is further split into divisions of 100 players each, so if you're a poor player you can still track your progress within your league and division, even if your overall standing is a number so high it can only be written using scientific notation.

Balancing an asymmetrical, three-race RTS is no easy task, but this isn't Blizzard's first time at the rodeo. The lengthy beta phase was spent perfecting the multiplayer balance, and that has paid off in the final game. People still complain, of course, and tweaks will surely be forthcoming, but any match-up can be won with the right strategy.

StarCraft II's map editor is the most potent yet, and plenty of custom games already exist, including old favorites like tower defenses, RPGs, and hero combat games. New features in the editor allow even more ambitious projects, like a cart-racing level and a side-scrolling shooter. Unfortunately, Blizzard has done away with the ability to download custom maps outside of the game—if you want people to be able to play your map, you have to host it on Battle.net, which imposes size restrictions on your uploads.

The only real shortcoming to StarCraft II is that it's more of an evolutionary product than a revolutionary one. That's always been Blizzard's strength, but when you're evolving a game that's more than 10 years old you risk dating yourself. The gameplay in StarCraft II is solid as a rock, but next to some of the more sophisticated recent games like Dawn of War 2 and Company of Heroes, it seems a bit dated. Of course, one person's "dated" is another person's "classic," but if you don't like real-time strategy games, this probably isn't the game that's going to change your mind. **—ALEX CASTLE**

VERDICT 9

STARCRAFT II: WINGS OF LIBERTY

+ RTS	− RLS
Long, engaging single-player game; fine-tuned multiplayer competition.	Not as innovative as the original; custom game browsing needs work.

$60, www.blizzard.com, ESRB: T

LAB NOTES

Blu-ray 3D on a Laptop

A few things to consider

KATHERINE STEVENSON
DEPUTY EDITOR

One thing I learned while testing 3D laptops this month is that support for Blu-ray 3D is not a given. Even the laptops that did support Blu-ray 3D (all of them 3D Vision–based rigs, in this case) were stymied by the PowerDVD 10 3D software player, which had conflicts with the latest Nvidia graphics drivers. Fortunately, a prerelease version of Corel WinDVD for 3D helped me out (although, it didn't work on our desktop rig for the 3D monitor tests—go figure!).

Once you've got Blu-ray 3D going, you might decide that a 15-inch screen doesn't actually do it justice. But you'd be wrong to assume you can connect these laptops to a 3D TV. You need HDMI 1.4 for that and these notebooks come with HDMI 1.3. This works with a 720p 3D projector, such Acer's H5360. And if you want to share that big screen experience with anyone else—your family, for instance—consider this: You'll need to purchase additional shutter glasses, which currently cost $155 a pair, and position your company in the proper proximity to the laptop's IR emitter.

GORDON MAH UNG
SENIOR EDITOR

I've been doing a lot of PC repairing for family lately and I've come to decide that Windows XP is way past its prime. It's just not secure enough for civilians who can't be bothered to keep the OS and apps patched. It's fine for a security-conscious nerd, but even when I tell relatives to patch certain apps, they don't do it.

MICHAEL BROWN
REVIEWS EDITOR

Foiled again by conflicting technology standards. The remotes for my Wayne Dalton Z-Wave-enabled garage-door openers have three buttons, so I can open either door with one remote. I recently installed a Mighty Mule gate opener at the end of my driveway and planned to use the third button to open that. No such luck. The gate opener operates on a different radio frequency.

NATHAN EDWARDS
SENIOR ASSOCIATE EDITOR

This month I finally settled down and started using my Kindle daily. Project Gutenberg's huge library of free ebooks, Amazon's wireless delivery, and Calibre's ebook management software haven't changed how much I read, but they've dramatically reduced the number of books I carry around everywhere. Ebook readers can't replicate that new-book smell, but if you read as much as I do, they're worth the investment.

GEORGE JONES
EDITOR IN CHIEF

Nathan and I just spent a few hours prepping the Lab to begin building PCs for our brand-new Build It section. Over the last few months, we've received tons of ideas from readers, and I think for our first official project we're going to see how fast we can push performance in a tiny, Mini-iATX box. This will be an interesting challenge—small formfactor rigs can run pretty hot.

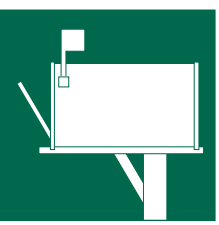
ALEX CASTLE
ONLINE MANAGING EDITOR

There are a lot of cool games coming up (Mafia II not least among them), but I just don't see myself getting over StarCraft II any time soon. I'm in the Gold league now, but I'll be damned if I can give up before at least hitting Platinum.

If Blizzard is good at one thing, it's making games that you never quite feel "done" with.

We tackle tough reader questions on...

Blu-ray Burners
James T. Kirk
The Geek Quiz



Geek Quiz Winner

I'm hoping I'm the first person to decode the Geek Meter entry for getting 46–60 answers correct in September's Geek Quiz. I couldn't find any mathematical patterns... this was just my attempt at decoding based on language structure. Here's what I get from the code: "Check out the big brain on Brett. You're a smart mother! That's right! The metric system!" Am I even close?

—Ric Marques

Senior Editor Gordon Mah Ung Responds: You are indeed correct, Ric! For those who were left baffled by our code, it's a cleaned-up version of Jules Winfield's line from *Pulp Fiction* converted into hexadecimal EBCDIC.

Wrong about Kirk?

In question 16 of your Geek Quiz ("In which property was James T. Kirk's middle name first revealed?"), the correct answer is "never." If you remember the episode titled "Where No Man Has Gone Before," there's a grave dug for Kirk and the middle initial is R. That name was scrapped for his next middle name of Tiberius, although we never got to find out what the R stood for.

—Spencer Fine

Maximum PC Columnist and Hugo Award–Winning Author David Gerrold Responds: From a canonical point of view, the headstone in "Where No Man Has Gone Before" represented Gary Mitchell's flawed memory, not actual fact. From a writing point of view, DC Fontana says, "It was a mistake. We forgot about the headstone." Somewhere along the line, the producers began calling him James T. Kirk instead, and that's the official designation. The R only shows up in that one episode, nowhere else.

At a *Star Trek* convention in 1973, DC and I were on a panel. Someone asked what the T stood for and I—jokingly, because I had just seen *I, Claudius* on PBS—said, "Tiberius." DC laughed and agreed. A year later, when we went into production with *Star Trek: The Animated Series*, I saw an opportunity to put that into an episode I was writing, called "BEM." So the correct answer has to be B, *The Animated Series*.

We're Jealous of Your 12-Year-Old

My son (age 12) has been saving his birthday and Christmas gift money since he was five, in order to build a fast gaming rig when he "grew up." That day has finally come and he spent $3,300 to build this thing: an EVGA Classified E760 X58 board, a 2.8GHz Core i7-930, a ThermalTake Spin-Q, 6GB Kingston HyperX T1 DDR3/1600, two 300GB VelociRaptors, two EVGA GeForce GTX 480s in SLI, a Lite-On DVD burner, Labtec LCS-2424 speakers, and an Acer 23-inch panel. It runs great, but we were wondering: What is the next upgrade that you guys would recommend? Should we bump up the memory, make the move to Win7, or add a third videocard with a bigger PSU?

—Bill Wacker

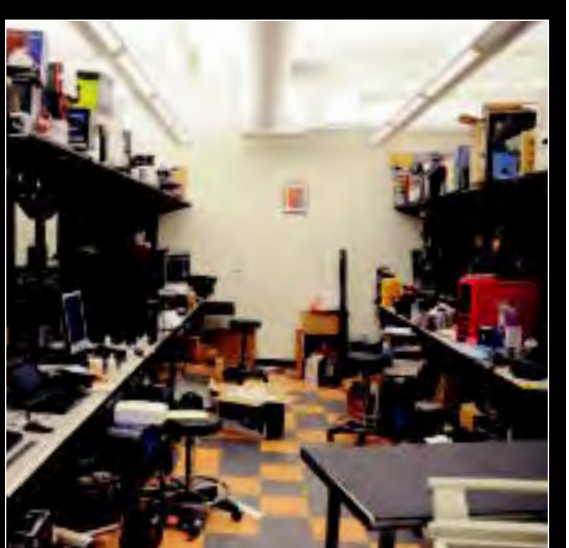
CUTCOPYPASTE

▶ In the September issue, we incorrectly reported the HP TouchSmart 600-1055's memory configuration. The machine is outfitted with one 2GB DIMM and one 4GB DIMM, so 4GB runs in dual-channel mode and 2GB runs in single-channel mode.

NOW ONLINE

Photo Awesome

Ever want to know more about the daily shenanigans here at the Maximum PC office? Well, now you can, because we're sharing a batch of behind-the-scenes photos every Friday on MaximumPC.com. We've already posted photos of the Lab, the office, our trip to the laser lab, and more. Check them all out at http://www.maximumpc.com/tags/photo_awesome.



Senior Editor Gordon Mah Ung Responds: That setup is fine to play today's and tomorrow's games. If it were my box, the next upgrades would be overclocking the CPU and adding an SSD and Windows 7. With a 1920x1080 panel, two GTX 480s are well beyond overkill. I'd only consider tri-SLI if running a 30-inch panel, but for 24 inches and under, your son is set. Down the road, I'd probably look at moving to a hexa-core processor when they're cheaper, and perhaps 12GB of RAM, but he should be happy for quite some time.

Blu-ray Brouhaha

I find it strange that you guys continue to recommend optical drives that are not Blu-ray burners in your custom builds. In the early 1990s, I would hope you didn't make the recommendation that people should stick with floppy drives, as CD-ROMs were just an extravagance. First, the drives aren't that expensive, and the prices of discs are dropping like a rock, as they're available on sale for as little as $1 each. Why the resistance to what is obviously going to be standard in the near future?

—Adam Schumacher

Deputy Editor Katherine Stevenson Responds: Make no mistake, we are all for backing up content. Our opinion regarding Blu-ray is colored by our own personal experience. Here at *Maximum PC*, we have a Lab full of high-performance Blu-ray drives and a fair amount of BD media for testing purposes, and yet, not a single editor on staff takes advantage of that access to use Blu-ray for backup purposes. We all use external hard drives, which are a far better bargain. When you can find a 3TB Free Agent selling for $230-$260, why would you want to spend even $150 for a BD burner and then more money on discs (a 10-pack of 50GB BD media costs $90 on Newegg)? And now with USB 3.0, there's no question of which option offers the faster transfer rate. So yes, we think given its limited utility (in our minds), a Blu-ray burner is an extravagance.

Compare... If You Dare

In your August 2010 issue, you compare the Origin PC Genesis to Digital Storm's HailStorm and Maingear's Shift, and you state that the Genesis "now holds five benchmarks records." Honestly, I can't see how you can make this claim, for these systems were not built at the same time. While the Genesis does have the best mobo of the three, this same mobo can be selected when configuring the other two. The same goes for the GPUs. If you have the courage to print this in an upcoming issue, I challenge you to put your money where your ink is, and do an article pitting all three, with (as close as possible) identical builds, against each other.

—Robb Ryan

Senior Editor Gordon Mah Ung Responds: We made that claim because we record the benchmarks for each machine as they come through. The Genesis recorded the highest in five benchmarks. I know that you are making an assumption that a newer PC is going to be faster because it has newer parts, but I've seen that proven wrong many times in the past. We've actually had old machines (in particular, a Velocity Micro PC) hold benchmark records for months on end.

Yes, ideally roundups make such comparisons even more exciting, but I can tell you from direct experience that there are also sticky questions to answer there too, such as pricing, availability, and even when the machines are submitted to us and when they're available for sale. Frankly, asking all three manufacturers to send us machines with identical parts seems pretty boring to me.

LETTERS POLICY Please send your questions and comments to comments@maximumpc.com. Include your full name, city of residence, and phone number with your correspondence. Letters may be edited for space and clarity. Due to the amount of mail we receive, we are unable to respond personally to all queries.

NEXT MONTH

COMING IN
MAXIMUM PC's
GLUTEN-FREE*
DEC
ISSUE

Windows 8: WTF?
Early information has already leaked on Microsoft's new OS. Next month, we're going to put all the rumors together and identify the likely growth and improvement paths for Windows 8.

10 Most Important Mobos of All Time
Gordon Mah Ung names the 10 motherboards that were so important they made us laugh, cry, and (sometimes) snort Coca Cola out of our nostrils.

High-End Router Shootout
Reviews Editor Michael Brown has been holed up in the Lab for days, testing the fastest routers on the market. He'll declare a definitive winner next month.

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HIGH-END COOLER

Prolimatech Armageddon

Make no mistake: The $30 Cooler Master Hyper 212+ offers the best bang for your buck of any air cooler. It's incredibly effective and amazingly inexpensive, and it well deserves its slot in our Best of the Best lineup. But what about coolers that are more effective, but also more expensive? Case in point: This month's Prolimatech Armageddon. With two 14cm fans, its average full-burn temperature was 6.5 C lower than the Hyper's. Its mounting bracket and fans are also better, but with two fans, it's three times the price. Is it a better value? That's for you to decide, and that's why we're adding a category to Best of the Best: High-End Cooling. www.prolimatech.com

THE REST OF THE BEST

High-End Processor
Intel 3.33GHz Core i7-980X
www.intel.com

Midrange Processor
Intel 2.93GHz Core i7-870
www.intel.com

Budget Processor
AMD Phenom II X6 T1055
www.amd.com

LGA1366 Motherboard
Asus Rampage III Extreme
www.asus.com

LGA1156 Motherboard
Asus Maximus III Formula
www.asus.com

AM3 Motherboard
MSI 890FXA-GD70
www.msi.com

High-End Videocard
ATI Radeon HD 5970
www.ati.com

Midrange Videocard
Gigabyte GeForce GTX 470 GV-N470D5-131-B
www.gigabyte.com

Budget Videocard
Asus 460 ENGTX TOP 768MB
www.asus.com

Capacity Hard Drive
Western Digital Caviar Black 2TB
www.wdc.com

Performance Storage
OCZ Vertex 2 100GB SSD
www.ocz.com

Air Cooling
Cooler Master Hyper 212+
www.coolermaster.com

DVD Burner
Samsung SH-S223
www.samsung.com

Blu-ray Drive
Plextor B940SA
www.plextor.com

Full-Tower Case
Corsair 800D
www.corsair.com

30-Inch Display
HP ZR30w
www.hp.com

Speakers
Bowers & Wilkins MM-1
www.bowers-wilkins.com

Gaming Mouse
Madcatz Cyborg R.A.T.7
www.cyborggaming.com

Games we are playing

StarCraft II: Wings of Liberty
www.starcraft2.com

Minecraft
www.minecraft.net

Sid Meier's Civilization IV
www.civilization.com

Team Fortress 2
www.teamfortress.com

For even more Best of the Best entries, such as speakers and budget components, go to www.maximumpc.com/best-of-the-best.

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